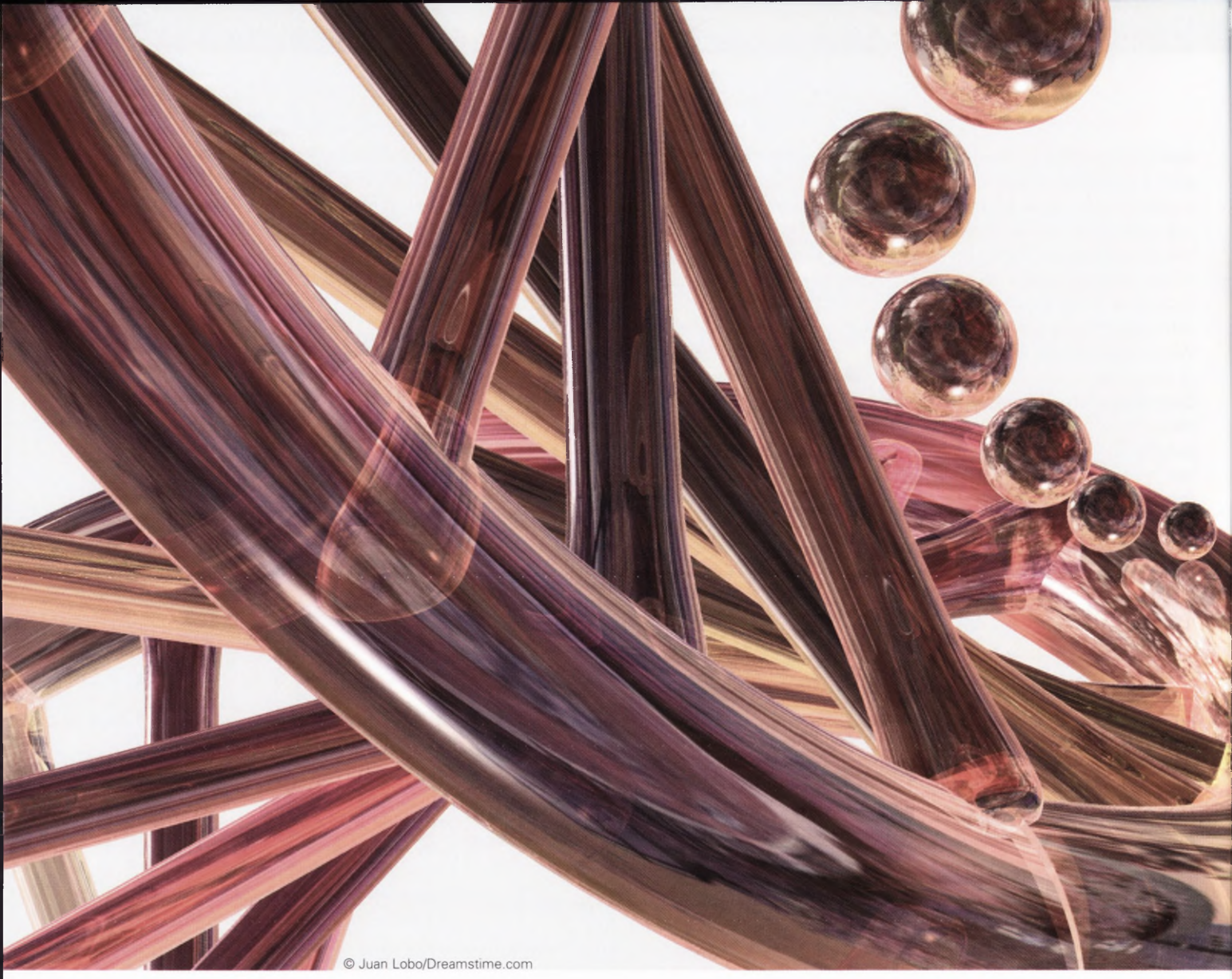

DNA for defence lawyers

By Andrew Haesler SC

Jurors believe DNA evidence to be 'significantly persuasive'.[1] Evidence of a DNA 'match' between a crime scene and your client is very scary for those of us whose job it is to raise a reasonable doubt and prevent unjust and unwarranted convictions. The fact that it involves science, maths and statistics may go some way towards explaining the 'prevailing ignorance about the nature and potential of DNA evidence among lawyers and judges'.[2]

Often the question is not 'Whose DNA is it?' but 'How did the DNA get there?' This latter question is the sort that legal skills best equip us to deal with.

This paper addresses some of the issues that can arise when the prosecution seeks to put DNA evidence before the court at trial, looking briefly at the science and then discussing trial tactics.

SCIENCE AND TECHNOLOGY

Legislation in each state and territory[3] allows police to obtain a DNA sample from those suspected of involvement in a crime and from those convicted of serious offences.[4] Each state and territory now has a database of crime scene, suspect and convicted offender samples that can be compared and matched. They also exchange information with the federal DNA database, NCIDD,[5] which is managed by an organisation known as Crim Trac.

A crime scene sample is taken either by swab or by collecting an exhibit for sampling. A whole exhibit is examined visually and samples taken from areas where it is presumed DNA might be found. These samples and crime scene swabs are then tested to see if it is possible to determine the type of material found: blood, semen, skin (epithelial) cells or saliva, for example. It is not always possible to determine the type of material. The item is then processed by technicians supervised by a biologist, who interprets the results.

Too much DNA can skew a sample. Too little can lead to a 'no result'. Some products, including cloth dyes or cleaning agents, can inhibit DNA analysis. Ultraviolet light, heat, humidity or bacterial action can destroy DNA. Ideally only a very small amount is needed. Between 0.5 and 1 nanogram of DNA per 20 microlitres[6] is used. A nanogram is one thousand millionth of a gram, which gives some indication of the sensitivity of DNA analysis!

The small amount of DNA found is copied or amplified by a process known as 'polymerase chain reaction'. This process also enables multiple points on a person's DNA to be analysed at the one time.

Those copies are then analysed and a series of graphs and readouts obtained. The beauty of the science and technology of DNA testing is that the process results in visual charts and computer readouts that describe what cannot be seen. Multiple points on the DNA are tested and analysed.

In all Australian jurisdictions, the processing of evidence for DNA follows a fairly standard procedure based on commercially available kits. Nine loci are tested as part of the Profiler Plus system. In addition, a test is done of a gene known as amelogenin, which determines gender.

The graphs and charts give a set of numbers corresponding to each of the known points. These numbers can be computer-coded and placed on the DNA database. When the same series of numbers comes up on another part of the database – for example, with a crime scene, suspect or convicted offender – a 'match' is called and the two results further interpreted to see if the provisional match is justified.

If the numbers do not match a suspect is *excluded*.

If a suspect cannot be either matched or excluded, the result will be reported as 'not excluded'. That a person is 'not excluded' can have no real relevance as a proof, as almost anyone taken at random could fall into this category.

Problems with the science and technology involved in DNA analysis

The science backing DNA analysis is good and improving all the time. The technology has been tested and cross-tested. Various protocols ensure that results are validated and are designed to detect any possible contamination. However, mistakes have occurred and will occur again.[7] Deliberate corruption of results has also taken place.

In any contested DNA case, it is essential to examine the laboratory file itself to check that all procedures and protocols were followed.[8] How clear were the results? What value judgements were made? Were there any dubious matches? Was there any evidence of contamination?

The supervising biologist's subjective interpretation of the results is a crucial factor in assessing whether a suspect sample and a crime scene sample 'match'. The interpretation of DNA results can be a fertile ground for cross-examination, particularly in the following areas:

- Where there is only a partial match;
- Where the reading is weak;
- Where the crime scene sample is a mixture of more than one person's DNA;
- Where there may be contamination;
- Where there is the possibility that the results were skewed by mutation; and
- Where the DNA may not have been directly deposited – secondary transfer.

As an example, I consider secondary transfer.

Recent developments in DNA processing have enabled readable DNA to be obtained from tiny samples, unimaginable even a few years ago. DNA can now be recovered from a single cell, and it is possible for as few as 30 cells to be processed in order to give a readable result. Similarly, DNA can now be recovered from objects where no bodily fluids are apparent; samples so small that they can be obtained from a fingerprint impression and from items such as knife handles or spectacles.[9] In some cases, enough DNA can be recovered for analysis by conventional techniques.[10]

Given that we shed 40,000 skin cells a day, a lot of our DNA is left lying around. It appears that some of us are 'good shedders,' and others are not. Experimental studies on Low Copy Number DNA have shown that a simple series of handshakes can transfer DNA from the original source to a third party.

The trial of Barnes (Wollongong Supreme Court, February 2004) provides an example. A young woman was found dead in a park in Dapto, her discarded clothing covering her naked body. The accused's DNA was recovered from her bra. Evidence established that about an hour before her death the two had met outside a club. Both were drunk, and the accused in particular was in a jolly mood shaking hands with a number of complete strangers. The problem posed for the >>

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defence was how did his DNA come to be on the bra strap of a women who when they met was wearing a vinyl coat and a singlet over her bra? However, the Division of Analytical Laboratories (DAL) analyst was dismissive of suggestions that spittle or DNA from Barnes's hand had got on to either the victim or her jacket and then been transferred to the bra. The jury, judging by its not guilty verdict, was more accepting of the possibility of secondary transfer!

So be careful! Do not accept DAL reports at face value if they conflict with your instructions. A report concluding that there is a match and a high figure for a match probability does nothing to distinguish unassailably powerful DNA evidence from weak misleading DNA evidence. Nor does it provide any insight into the circumstances under which the sample was deposited. However, if the report checks out, it may be time revisit your client's instructions.

TACTICAL CONSIDERATIONS

A DNA 'match' can be the centrepiece of the Crown case. Despite all the potential problems noted above, it will, more often than not, remain so. The legitimacy of DNA evidence has been enhanced by the relatively few cases where DNA has been used to exonerate an innocent. Exclusions have resulted in no bills or the direction of police investigation along more fruitful lines. However, DNA evidence can be challenged in a number of ways.

Challenging match probability

A lot of time and effort can be expended in confronting a DNA 'match' to no avail – *R v Karger*[11] is an example. Attacking the statistical basis of an expert's conclusion can be rewarding if there is no other evidence, or if the other evidence is weak – *R v Bropho*[12] is an example. However, reducing a match probability from 1:10 billion to 1:1 million can be a waste of time and effort unless the expert's opinion is totally discredited in the process.

Alibi

An alibi may defeat DNA. This occurred in the 'Manchester mismatch' case – the first known example of a false match, said to be a one in 37 million chance. Only retesting, after an unassailable alibi was put forward, led to the dropping of charges.[13] But, realistically, how many of us have ever had a case proceed to trial where the alibi evidence was watertight?

Breaking the connection

While a connection between the accused and the crime scene, together with DNA, can be more than sufficient to convict, the absence of a such a nexus can be vital in defusing the impact of the DNA evidence. This is what occurred in *R v Cohen*,[14] a gaol killing. There, the fact that the suspect's sock was found in the victim's cell simply showed that anyone could have put it there. The extreme portability of DNA makes the possibility of planting a sample a fertile field for testing and cross-examination.

Who else's DNA is in the mixture?

The finding of multiple donors in a crime scene sample, in particular an unknown minor contributor, can cast doubt on the inferences the Crown wishes the jury to draw. If the DNA can be made consistent with an alternative theory, the very power of the DNA evidence in the minds of the jury can lead to it being co-opted into the fabric of doubt.

What does a match mean? If there is an unknown contributor, could they be the culprit? In the Barnes trial, for example, DNA from two men who could not be identified was found on the waistband of the deceased's jeans. The failure of the prosecution to exclude the donors of these samples seriously weakened its case against the accused.

In sex matters question whether, prior to extraction, attempts were made to separate sperm from other cells,

which may have come from the victim. Were only sperm cells examined? 'Where did the minor contributor's DNA come from, sperm or other cells?' In most cases the answer must be, ' I can't be sure.' If it is sperm, it may mean a second male suspect. If not, it may simply be from the complainant or contamination during the collection of the sample.

Why wasn't my client's DNA found?

As DNA becomes more regularly used its absence, too, can be used. 'We would expect the accused's DNA to be found given the power of technology and the actions he is accused of.' 'Why wasn't it?' Defence lawyers can and should celebrate the science and express disappointment when there is a negative outcome.

Spread confusion?

While often done inadvertently or because of incompetence, as a tactic spreading confusion has doubtful merit. Confusion between experts does not always favour the defence. It is a fallacy that confused juries acquit.[15] Most jurors approach the trial with high expectations of the significance of DNA evidence. They will see through attempts to side-step its probative and prejudicial weight.

Challenges to the chain of custody

What have the police done with the DNA before it got to the lab? *R v Lissoff*[16] is a possible example of deliberate contamination. However, contamination is just as likely to be accidental or innocuous. For example, was the correct exhibit sent to the lab? Has there been a mix up of offender and victim's samples? Check the exhibit records, 'was the exhibit signed out a week earlier?' 'Does it refer to the same thing that was delivered to the DAL lab?' Sloppy record-keeping can provide a fertile source of material for cross-examination and can lead to the exclusion of the evidence.

Often the question is not 'Whose DNA is it?' but **'How did the DNA get there?'**

In *R v Sing*[17] and *R v Ryan*[18] it was held to be crucial that everyone who handled and tested the DNA exhibit be called to give evidence. However, I have never seen anything useful come from calling for cross-examination of the lab technicians, other than the person who first examined the potential DNA sites on the exhibit and the supervising biologist. The DAL worksheet tells you all you generally need to know about what the technicians did. The person who initially tested the >>

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exhibit may fruitfully be examined about why some areas of an object were tested, and not others.

Contamination

As indicated above, most lab contamination is picked up by the protocols in place. The few examples of lab mix-up have been thoroughly investigated. Lab contamination is more likely to exclude than falsely implicate a suspect, because a contaminated sample cannot be accurately analysed.

The best advice I can give is focus on the police, not the lab. The OJ Simpson case is a textbook example of how the police can be attacked either for sloppy or biased investigation.[19] Carefully cross-examine the crime scene police: 'Who was fiddling about the crime scene when they arrived?' 'Was each piece of evidence picked up with clean tweezers?' 'How often did you change your gloves?' 'Were facial masks worn?' 'How were the separate exhibits stored – at the crime scene, on the way to the station and at the station?'

The police continuity evidence will consist of a statement saying, 'I collected the exhibit from point A and took it to point B'. It may appear innocuous, but the author rarely adds in 'Oh, and by the way the exhibit fell out of the bag as I picked it up' or 'I forgot to use gloves'. Check the exhibit records and make sure the right exhibit was sent for analysis. Check, too, that the client sample being used was in fact lawfully taken or lawfully on the database – for example, a suspect sample *must* be destroyed after 12 months.

SCHOOLS

Dr Keith Tronc, Barrister-at-Law and an APLA/ALA member of long standing, who has been invited to speak at the last seven APLA/ALA National Conferences, is a former teacher, school principal, TAFE teacher, university lecturer, solicitor and Associate Professor of Education. He assists numerous Australian law firms in educational litigation involving personal injuries, discrimination, bullying, sex abuse, breaches of contract, and TPA matters. Dr Tronc appears frequently in court in several States providing independent expert opinion on matters concerning education and the law. Dr Tronc has published four national textbooks and looseleaf services on schools, teachers and legal issues.

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Bias in the lab?

In *R v Button*[20] the forensic scientist looked only for evidence that would implicate the accused and missed, because they did not do the relevant tests, vital evidence pointing to the real culprit. Justice Williams described the various failures in the case as resulting in "...a black day in the history of the administration of justice in Queensland". Deliberate failure to investigate, or pressure of work and a focus on output rather than using the genuine forensic expertise, can lead to error. The quest for volume can mean that only one exhibit or part of an exhibit is analysed. As *R v Button* shows, this is simply not good enough. When cross-examining an expert or technician about what was tested, it is sometimes prudent to find what was *not* analysed.

Secondary transfer

In my experience, most prosecution experts will try to avoid a concession that secondary transfer can occur. At the same time, those same experts will acknowledge that the sensitivity of the 'normal testing' equipment now available to the DAL is so good that they can now re-test old samples that a few years ago failed to reveal DNA, and find it.

As the Crown expert noted during the Barnes trial, much will depend on the quantity of DNA and the nature of the original specimen. The smaller the sample and the more portable the specimen (for example, skin or saliva), the greater the possibility that it has been innocently transferred.

The transfer of DNA may explain the apparently inexplicable. A concession by an expert that secondary transfer can occur must undermine the certainty with which an opinion is given. If the DNA could have come from anywhere, a 'match' has little if any relevance.

Concessions will not generally be made. You need to work for them with detailed and careful cross-examination and a possible alternative hypothesis that has common sense plausibility.

HOW LONG DOES DNA LAST?

DNA samples have been obtained from very degraded objects – *R v Keir*[21] is a good example. (In *Keir*, DNA was extracted

from a few bone fragments said to the be the missing Mrs K. They had been found under the family home 10 years after she 'disappeared'.)

Examinations of 'cold cases exhibits' have turned up nuclear DNA from exhibits over 10 years old – *R v Stone*,[22] where Stone pleaded guilty in 2004 to a 1990 murder, is an example.

DNA will degrade in sunlight, heat and humidity and can simply be eaten up by bacteria and other micro-organisms. It can be washed and cleaned away. It is not particularly resistant to modern cleaning products. However, if kept away from light and heat, in a cool, regulated environment, it can last a surprisingly long time. DNA is regularly extracted from under fingernails hours, and sometimes days, after an incident. (Perhaps if the new technology does not produce a more wary criminal, it may lead to a cleaner one.)

CONCLUSION

As defence lawyers, we will have to learn to live with DNA evidence. If we are to live with it, we have to understand it. If we are to challenge it, we need to understand it better than our opponents do. If we are to use DNA evidence, we must understand how juries view it. We need to work out strategies to use it, challenge it or reduce its significance. Alternatively, we can accept the expert's conclusions and work our case around their findings, even if the only advantage is an early guilty plea. DNA can also exclude a suspect or point to an alternative culprit. We should not waste the courts' or our time on futile challenges. Rather, we need to learn to use the evidence to our clients' advantage. ■

Notes: **1** M Findlay & J Grix, 'Challenging Forensic Evidence', (2003) 14 *Current Issues in Criminal Justice* 269 at 273. **2** *Ibid* at 272. **3** In NSW, the *Crimes (Forensic Procedure) Act* 2000 (NSW) and Part 1D *Crimes Act 1914* (Commonwealth). **4** See paper by Andrew Haesler on the Public Defenders Website, *DNA – An Overview of Testing and the Crimes (Forensic Procedures) Act 2000.'* **5** National Criminal Intelligence DNA Database. **6** A micro litre (ul) is 1 millionth of a litre. There are about 15 drops of water in a millilitre (1 thousandth of a litre). **7** UK DNA Mismatch www.scoop.co.nz/stories and 'Murder DNA tests botched' The *New Zealand Herald,* 26 May 1999. In *R v Lisoff* [1999] NSWCCA 364, the CCA ordered a re-trial. Lisoff was subsequently acquitted. The victim's blood found on L's trousers had been planted. It contained transfusion products and thus had arguably been taken from the victim *after* the assault and *after* he went to hospital. **8** See *R v Doherty & Adams* (1997) 1 Cr App 369 and *R v Karger* (2002) 83 SASR 135. Most DNA reports do not comply with the DPP's duty of disclosure : www.odpp.nsw.gov.au PolicyGuidelines **9** Van Oorschot & Others, *Nature* Vol: 387 (1997) p787. These finding have however not always been reproducible, Ladd & Others, 'A systematic analysis of secondary transfer', *Journal of Forensic Science* (1999) Vol: 44 pp1270-2. See also Raymond, Walsh, van Oorschot, Gunn & Rouk, 'Trace DNA: An Underutilised Resource or Pandora's box", *Journal of Forensic Identification*, 56 (2004) pp668-86. **10** Gill, '*Biological Evidence.*' Paper to 13th Interpol Forensic Science Symposium, Lyon, France October 2001; Van Renterghem & others, 'Use of Latent Fingerprints as A Source of DNA', *Progress in Forensics Genetics* Vol: 8, pp501-3. **11** (2002) 83 SASR 1. **12** [2004] WADC 182. **13** See note 8. **14** [2002] NSWCCA 339. **15** M Findlay, *Managing Juries in NSW*, Australian Institute of Judicial Administration (1994). **16** [1999] NSWCCA 364. **17** (2002) 54 NSWLR 31. **18** [2002] VSCA 176. **19** The OJ case is extensively referred to in both Butler and Buckleton, Triggs & Walsh, *Forensic DNA Evidence Interpretation*, CRC (USA) 2004. **20** [2001] QCA 133. **21** (2002) 127 A Crim R 198. **22** [2004] NSWSC 224.

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This is an edited version of the paper, 'DNA for defence lawyers', available on the Public Defenders website: www.lawlink.nsw.gov.au/pdonsf/pages/first

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