NEW SOUTH WALES SUPREME COURT

CITATION: Regina v David John McIntyre [2001] NSWSC 311

CURRENT JURISDICTION:

FILE NUMBER(S): 70041/00

HEARING DATE{S): 26/03/01 - 24/4/01

JUDGMENT DATE: 11/04/2001

PARTIES:
Crown
David John McIntyre

JUDGMENT OF: Bell J

LOWER COURT JURISDICTION: Not Applicable

LOWER COURT FILE NUMBER(S): Not Applicable

LOWER COURT JUDICIAL OFFICER: Not Applicable

COUNSEL:
Mr N. Harrison (Crown)
Mr P. Segal (Accused)

SOLICITORS:
SE O'Connor (Crown)
Hugo Schleiger & Associates (Accused)

CATCHWORDS:
Voir Dire hearing - Admissibility of opinion evidence as to results of DNA testing using Profiler Plus system

ACTS CITED:
Evidence Act 1995

DECISION:
Evidence admitted

JUDGMENT:

THE SUPREME COURT

OF NEW SOUTH WALES
CRIMINAL DIVISION

BELL J

LISMORE: WEDNESDAY 11 APRIL 2001

REGINA v DAVID JOHN McINTYRE

JUDGMENT: On admissibility of evidence; see page T905.

HER HONOUR:

1. Mr Segal objects to the admission of opinion evidence from Robert Goetz as to the results of DNA testing conducted upon various items, including samples taken from the stained foam mattress located at the accused's home, the carpet located in the second bedroom of the accused's home, the carpet found in the boot of the accused's Chrysler Scorpion sedan and the Guthrie's card relating to Luke Gregory.

2. In each instance the DNA analysis was conducted by means of the Profiler Plus system. Profiler Plus is the commercial name given to a system marketed by Applied Biosystems, a United States company.

3. The basis of Mr Segal's objection to the reception of this evidence went principally to the reliability of results obtained by means of the Profiler Plus system . It was submitted that material identifying the primer sequences supplied with the Profiler Plus kit is not publicly available since the manufacturers consider it to be commercially sensitive information. It flowed from this that the Profiler Plus system is not open to critical discussion among the scientific community.

4. Mr Segal further submitted that Mr Goetz had what he described as a professional commitment to the Profiler Plus system which rendered him biased in favour of its reception by courts, such that he did not seek to inquire into the technical aspects of the functioning of the system.

5. Finally Mr Segal objected to evidence as to the probability of the source of any of the samples occurring by random chance within the general population. In this respect he contended that the opinion as to the statistical probability of a random match expressed by Mr Goetz in his report, Ex VD "B", was likely to have disproportionate and overpowering effect upon the jury. In his submission the database was too small to allow of a statistically valid conclusion.

6. I determined to hold a voir dire hearing on the preliminary question of whether the opinions expressed by Mr Goetz in his reports, Ex VD "B", "C" and "D", were admissible pursuant to s 79 of the *Evidence Act*, 1995 ("the Act").

7. I ruled that I would not permit the voir dire to extend to a challenge based upon a contention that the Profiler Plus system was not reliable in the sense that it had not received acceptance within the scientific community by reason of the non-publication of commercially sensitive material relating to the primers marketed as part of the kit. I propose to briefly note my reasons for so ruling.

8. Such an issue was one of a number of challenges advanced to the reception of evidence of DNA testing carried out by the Profiler Plus system taken on behalf of the accused in *R v Karger* [2001] SASC 64. In that case Mullighan J heard evidence on a voir dire extending between 3 July 2000 and 7 February 2001. On 29 March 2001 his Honour delivered a detailed judgment rejecting the challenge.

9. His Honour reviewed the evidence as to the widespread use of the Profiler Plus system in Australia and overseas and the literature dealing with it. in paragraphs 198 to 209. At paragraph 217 his Honour said:

> *"I have received a vast body of evidence to show not only general acceptance of the Profiler Plus as accurate and reliable but also of validation of the system in this country and overseas as has been discussed."*

10 In *Karger*, Mullighan J was concerned with the principles governing the reception of expert evidence at common law. He approached the matter upon the basis that the test of "general acceptance" in the particular field to which it belongs, laid down in *Frye v United States*, 293 Fed, 1013 (1923) had been accepted and applied as part of the common law of Australia. In this regard his Honour instanced *R v Gilmore* [1977] 2 NSWLR 935, and *R v Pantoja* (1996) 88 ACR 554, two authorities to which Mr Segal referred me.

11 *Gilmore* and *Pantoja* were decided before the introduction of the Act.

12 I am concerned with whether the evidence proposed to be led by the Crown meets the requirements of s 79 of the Act. It may be that the test of whether a field is one of "specialised knowledge" for the purpose of s 79 is more liberal than the *Frye* test. The learned author of *'Cross On Evidence'* observes that s 79 requires merely that there be "specialised knowledge", and that choice was deliberate (a reference to the Australian Law Reform Commission Interim Report No 26).

13 It appears clear that the section 79 test is not in any respect more restrictive than the common law test; *H G v The Queen* [1999] HCA 2; 197 CLR 414, at 432.

14 The question of whether a field is one of "specialised knowledge" for the purpose of s 79 of the Act does not require proof of the matters with which the Court was concerned in *Daubert v Merrell, Dow Pharmaceuticals Inc* 509 US 579; 125 L Ed, 2d 469 (1993), which include proof of capacity for testing, actual testing, peer review, publication and the like.

15 *Daubert* is the test applicable in the United States for the reception of expert opinion evidence. In this respect I note that in his extensive review of the authorities in *Karger*, Mullighan J observed that there are cases in the United States in which it has been held that the results of analysis using the Profiler Plus method were admissible; at (217).

16 In *Pantoja***,** Hunt C J at C L (in a judgment which Hidden J agreed) observed at 558:

> *"DNA testing has been accepted by the courts for some years as an acceptable scientific technique for the identification of the source of bodily tissues in accordance with the approach to scientific evidence generally adopted by this court in Gilmore."*

17 His Honour in *Pantoja* was dealing with evidence as to DNA analysis conducted by the restriction fragment length polymorphism (DNA (RFLP)) and the polymerase chain reaction (PCR) method.

18 I note Mullighan J's observation in *Karger* that it is inaccurate to describe the Profiler Plus system as a totally new system of DNA analysis in the same way that such a description could have been given to the short tandem repeat method and fluorescence technology when they first emerged.

19 In *Karger* His Honour went on to observe:

> *"The Profiler Plus system involves the processes familiar to forensic scientists of extraction, quantification, amplification, electropherosis and detection by automated sequences and assistance in interpretation by computer software."*

20 The only material upon which Mr Segal informed me he proposed to embark upon a challenge to the Profiler Plus system as not meeting the test for the admission of expert opinion evidence was as outlined in a short report prepared by Dr Brian McDonald dated 5 April 2001, Ex VD “I”.

21 In the light of the exhaustive review of the reception of evidence of DNA analysis undertaken by Mullighan J in *Karger* and having regard to the observations of Hunt CJ at CL in *Pantoja* to which I have already referred, I approached the challenge to the admission of Mr Goetz’s evidence upon the basis

that DNA testing by the Profiler Plus system is a field of "specialised knowledge" for the purposes of s79 of the Act.

22 Mr Goetz holds the degree of Bachelor of Science with Honours from the University of New South Wales. He has been employed as a forensic biologist since 1975. He is the officer in charge of the Forensic Biology Laboratory at the Institute of Clinical Pathology and Medical Research within the Division of Analytical Laboratories in New South Wales. He has held that position for the past sixteen years.

23 DNA testing was introduced into Mr Goetz' laboratory in the late 1980s. He has been associated with DNA testing since that time. Systems for DNA analysis making use of the PCR method have been used at his laboratory since 1994. Early systems investigated sequence variations along the DNA.

24 In 1996 the Division of Analytical Laboratories introduced a system making use of short random repeat (STR) analysis. The initial STR system was known as FSS Quad. It preceded the introduction of Profiler Plus. STR analysis investigates size (as distinct from sequence) variation. The FSS Quad system was in some respects similar to the Profiler Plus system in that it was an STR system using fluorescently tagged primers. The FSS Quad system was less discriminating than the Profiler Plus system because it investigated only four DNA loci.

25 Profiler Plus was introduced to the Division of Analytical Laboratories in the latter half of 1998. Profiler Plus investigates nine polymorphic loci in addition to the amelogenin locus which reports solely on gender. The Profiler Plus system is the system used by every laboratory in Australia which carries out forensic testing on behalf of the Police Service in that state. Each laboratory participates in a collaborative testing program run by an organisation based in the United States. Mr Goetz is responsible for checking the results obtained by each of the Australian laboratories after these tests have been

completed. He is the chairman of the Proficiency Review Committee which is a committee set up by the National Association of Testing Authorities (NATA) to determine whether Australian laboratories are meeting appropriate standards.

25 Mr Goetz attends an annual meeting of the section leaders of all forensic laboratories in Australia. At these meetings current trends in forensic analysis are discussed. Mr Goetz keeps up to-date by reading current scientific literature. He has read a large number of journal articles reporting on the Profiler Plus system. It is part of his function as the officer in charge of his laboratory to monitor journal articles relevant to work carried out at that laboratory and to pass on material to his subordinates. Biologists working under Mr Goetz' supervision have attended overseas conferences at which papers have been circulated concerning the Profiler Plus system. On their return to the Division of Analytical Laboratories they have reported to Mr Goetz and he has read the subject material.

26 There are two stages associated with the analysis of DNA by the Profiler Plus method. The first involves the extraction and amplification of the DNA and the placement of the sample onto the gel. The second is the interpretation stage. A computer software program generates the results. These results must in turn be analysed. The Profiler Plus system relies on the interpretation of electropherograms. These are computer generated documents which graphically illustrate the peak heights of alleles at each of the loci reported on by Profiler Plus. Mr Goetz has been involved in the interpretation of many thousands of electropherograms recording the results of tests conducted by means of the Profiler Plus system.

27 The interpretation of electropherograms requires specialist skill and knowledge. Artefacts may be present which means that an allele reported as, say, a “14” at vWA locus may be a false report. Mr Goetz described the common artefacts as being "stutter", "pull-ups" and something described as an "N".

28 An examination of the electropherogram relating to the testing of the sample taken from the foam mattress in the instant case shows the presence of an amount of stutter with respect to one or more loci.

29 Additional difficulties in interpretation arise from the possibility of a sample being a mixture of two or more different strands of DNA. Low or high levels of DNA in the test sample may cause other difficulties in the interpretation of the electropherogram.

30 I am satisfied that the interpretation of electropherograms produced by means of the Profiler Plus kit requires specialised knowledge based on training, study and experience and I am satisfied that Mr Goetz possesses the relevant training, study and experience so to do.

31 In his report of 25 October 1999 Mr Goetz expresses the opinion that:

> *"The DNA recovered from items 13 and 17 has the same DNA profile (in the Profiler Plus system) as the DNA from Gregory. Fewer than 1 in 10 billion people in the general population has this DNA profile."*

32 The calculation of the relative frequency of a particular DNA profile being encountered in the general population is ascertained by reference to a database. The database records the DNA profiles (as determined by the Profiler Plus method) of members of the community. From this database it is possible to determine the frequency of alleles at a given locus within the general population. Once this is determined, the frequency of a DNA profile occurring within the general population is obtained by multiplying the probability of the occurrence of each of the alleles at the nine loci. In this way, by the application of the product rule, one may arrive at a figure as to the statistical probability of a random match of the order of 1 in 10 billion.

33 In *Pantoja* Hunt CJ at CL observed at 561:

> *"In my view, until a general acceptance is accorded to the size of the DNA databases used by the various government laboratories and commercial testing organisations as has for a long time been accorded to the databases derived from blood substance testing such as Mr Goetz carried out, the Crown should lead such evidence where objection is taken - as it was here - to the admissibility of the statistics."*

34 Subsequently in *Regina v Milat* (unreported) NSW SC, 12 June 1996, Hunt CJ at CL gave further consideration to the statistical validity of DNA databases. His Honour accepted in that case that the statistical validity of databases compiled from as few as 100 to 150 persons was supported by a number of emminent scientists and scientific bodies. In that case his Honour admitted evidence as to the probability of a random match relating to DNA RFLP testing based on a database of 500 persons, in the case of DQ Alpha testing based on a database of 409 persons and in the case of Polymarker testing based on a database of 402 persons. His Honour attached an appendix to his judgment setting out the size of DNA databases used by laboratories in Australia and overseas.

35 Mr Goetz said that when the Profiler Plus system was introduced to the Division of Analytical Laboratories in late 1998 the database used by his laboratory comprised the profiles of 358 persons. In his view this was a sufficiently large group to yield statistically valid results. On 12 January 2000 the database was increased to 739 persons. The database reflects the profiles of the New South Wales community generally and is drawn from persons suspected of crime, persons alleged to be victims of crime and the sexual partners of persons alleged to be victims of crime.

36 Mr Goetz first reported his results in relation to the DNA testing carried out on the samples in this case by reference to the database of 358 persons. He has since carried out an assessment by reference to the database introduced in January 2000. The difference in the results obtained is statistically insignificant.

This is consistent with Mr Goetz' evidence that a database of some 350 persons will yield reliable results.

37 The DNA database used by Mr Goetz' laboratory has been examined by Dr Chaseling, statistician and Dr Weir, a United States forensic statistician. Both report favourably on it.

38 Mr Goetz has compared the New South Wales DNA database to the databases developed by other Australian states which use the Profiler Plus system. Each reveals a consistent pattern with respect to allele frequency at given loci. Thus an allele at the vWA locus which is rare in New South Wales will be rare among the databases in each of the other states. This reinforces Mr Goetz' confidence in the reliability of his database.

39 Mr Goetz studied population genetics and statistics in the course of his university studies. His honours project related to population genetics. He has read literature in the area of forensic statistics and he has attended a course on forensic statistics run by Dr Chaseling, Associate Professor of Statistics at Griffiths University.

40 In cross-examination Mr Goetz' attention was directed to the results given for items 11, 13 and 17 recorded in his report Ex VD “B” at the vWA and D18S51 loci. In each instance the Profiler Plus system reports the appearance of a homozygote. Mr Goetz agreed that a homozygote appears on an electropherogram as a single peak. He agreed with the proposition that Profiler Plus is not able to discriminate between a true homozygote and the phenomenon of a nullallele. A nullallele is the non-expression of an allele at a certain locus. This phenomenon may occur as a result of a primer binding site mutation. Mr Goetz described the phenomenon of nullalleles as being extremely rare. Paternity testing has shown this to be the case.

41 In Mr Goetz' opinion the possibility of one or more of the reported homozygotes being in truth, a nullallele would not alter his opinion as to the statistic probability of a random match within the general population. I did not understand Dr McDonald, molecular geneticist who was called by Mr Segal, to be at issue with Mr Goetz in this respect. If anything, I understood Dr McDonald to advance the view that the statistical probability of a random match in the general population would be a figure greater than 1 in 10 billion in the event that one of the reported homozygotes was a nullallele.

42 Dr McDonald's point, as I understood it, was that the Profiler Plus system, together with any system of DNA testing in which nullalleles have been reported, is not capable of producing a valid result. This is for the reason that such systems cannot discriminate between a homozygote and a nullallele. Accordingly, there exists the possibility that one of the samples of the three items reported as items 11, 13 and 17 in Ex VD “B” does not have the same DNA profile as the other two items. One of the reported homozygotes might, in truth, be a nullallele.

43 This opinion did not seem to me to touch on the question of the statistical validity of the DNA database, or to bear relevantly on the question of the admission into evidence of Mr Goetz's opinion concerning the probability of a random match. It raises an issue as to the reliability of the Profiler Plus system, which it is open to the accused to explore in the presence of the jury.

44 I am satisfied that the challenge to the statistical validity of the two DNA databases relied upon by Mr Goetz for the formation of his opinion as to the probability of a random match has not been made good. I am satisfied that Mr

Goetz's training, study and experience in the field of population genetics and statistics permits him to express the opinion which he does in Ex VD “B”.

45 I should, in passing, note the challenge that Mr Segal advanced based upon the contention that Mr Goetz had a "personal investment" in the acceptance of the Profiler Plus system by the courts. Some cross-examination was directed to this issue. Broadly it was put to Mr Goetz that he had staked his professional reputation on the success of Profiler Plus. Mr Goetz rejected this proposition, saying that he considered his professional reputation depended on the results of DNA testing carried out by his laboratory being reliable. If the Profiler Plus system did not deliver reliable results, he would recommend that his laboratory adopt a different system. I accepted him.

46 As I have already observed, questions as to the reliability of the Profiler Plus system are open to being explored before the jury. For present purposes I am satisfied that the opinions expressed by Mr Goetz in his reports, Ex “B”, “C” and “D”, both as to the results of the Profiler Plus tests, and as to the statistical probability of a random match, relate to matters in respect of which he has specialised knowledge based upon his training study and experience. I consider that the evidence is admissible.

47 I am not persuaded that the evidence either as to the results of the analysis or as to the probability of a random match should be excluded in the exercise of discretion.

****

LAST UPDATED: 26/04/2001