

DNA "FINGERPRINTING"

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INTRODUCTION

It has been hailed as a revolutionary tool in law enforcement. One federal official has called it "the most dramatic breakthrough for forensics this century."¹ It is DNA "fingerprinting," and the State of Virginia has become one of its leading proponents.

On September 22, 1989, the Virginia Supreme Court upheld the admissibility of DNA evidence in two trials resulting in rape and murder convictions of former Richmond resident Timothy Spencer.² Scientists performed tests on semen found at the scenes of both crimes and determined that the DNA pattern matched the pattern found in Spencer's blood. The court held that DNA testing was "a reliable scientific technique" and that in both cases the tests were properly conducted. Accordingly, the court held that the trial court did not err in admitting the DNA test results into evidence.³ The *Spencer* rulings marked the first time that a court heard an appeal from a murder trial based on DNA evidence.

STATEWIDE DNA DATABANK

Earlier this year, the Virginia General Assembly passed a bill authorizing the establishment of a statewide databank to store DNA fingerprints of convicted felony sex offenders.⁴ The legislation, which took effect on July 1, 1989, authorized testing of felony sex offenders who are currently incarcerated. State officials hope to use the DNA databank as an investigatory tool to aid law enforcement authorities. Samples of blood, semen, or hair recovered from crime scenes can be tested and matched against DNA fingerprints in the statewide databank. If a match or "hit" is produced, authorities can use the information to establish probable cause and obtain a search warrant for a criminal suspect.

¹ John Hicks, Assistant Director of the Federal Bureau of Investigation Laboratory Division in Washington, *quoted in* Richmond Times-Dispatch, Oct. 27, 1989, § D, at 2, col. 6.

² *Spencer v. Commonwealth*, Nos. 881268, 881288 (Va. Sept. 22, 1989).

³ Richmond Times-Dispatch, Sept. 23, 1989, § B, at 1, col. 5.

⁴ VA. CODE ANN. § 53.1-23.1.

A special subcommittee of the Virginia General Assembly is rewriting the 1989 statute in response to problems and concerns over the databank which have surfaced since July.⁵ According to Professor Walter J. Felton, Professor of Law, Marshall-Wythe School of Law, College of William and Mary, who is working with the special subcommittee, the 1989 statute did not specify which agency of the state government would pay for the DNA testing. The new statute is expected to correct this omission. In addition, the proposed legislation will improve procedures for testing convicts who are incarcerated in county jails and in rural areas.

The new statute is also expected to specify that the DNA databank is to be used solely for identification of suspects in criminal proceedings. The statute may include sanctions for wrongful use of DNA test results. These proposed changes were spurred by concerns that the databank might be used for purposes other than criminal law enforcement. According to Professor Felton, however, the subcommittee may revise the current statute to allow DNA testing of prisoners convicted of burglary. Professor Felton stressed that none of the proposed revisions have been finalized. The subcommittee will present the General Assembly with recommended legislation in the 1990 session.

Virginia is not alone in its efforts to incorporate DNA testing into its criminal justice system. Over half the states are exploring proposals to create DNA databases, and the FBI is attempting to create a national DNA information network.⁶

Despite its growing acceptance in the criminal justice system -- DNA evidence is admissible as evidence in eighteen states⁷ -- some critics charge that DNA testing procedures are far from foolproof and that extensive independent studies to determine their reliability should be undertaken before courts routinely admit the results of DNA tests into evidence.⁸ Moreover, the courts have not been unanimous in their determinations of admissibility. On August 14, 1989, New York State Supreme Court Judge Gerald Sheindlin refused to allow the results of a DNA test into evidence following a twelve-week pre-trial hearing in a Bronx murder case. Sheindlin held that although DNA testing was an accepted scientific procedure, the testing laboratory failed to use the proper tests. Sheindlin urged lawyers involved in previous DNA testing cases to examine trial records to

⁵ The formal title of the committee is the Joint Legislative Subcommittee Studying the Creation of a DNA Test Data Exchange Pursuant to Senate Joint Resolution 127.

⁶ Los Angeles Times, Sept. 15, 1989, Metro Section, Part 2, at 7, col. 4.

⁷ *Id.*, Sept. 14, 1989, § 1, at 3, col. 2.

⁸ See Thompson and Ford, *DNA Typing: Acceptance and Weight of The New Genetic Identification Tests*, 75 VA. L. REV. 45 (1989).

determine whether appeals, based on his decision, would be appropriate.⁹

There is widespread disagreement over the potential impact of Judge Sheindlin's ruling. Critics of DNA testing hailed the decision and said previous DNA testing cases should be reopened. Some proponents of DNA testing, however, interpreted the ruling as a victory. The Bronx District Attorney, Robert T. Johnson, said the court had upheld the validity of DNA testing.¹⁰ Judge Sheindlin, in an appearance on ABC's Nightline, commented that his ruling had stressed that DNA testing was "a powerful, accepted scientific procedure."¹¹

Critics of DNA testing have expressed concerns over proposals to create DNA databanks as an aid to law enforcement. Professor Donald Shapiro of New York Law School has argued that DNA fingerprints will be used for non-law enforcement purposes to discriminate against individuals. Shapiro's concerns are premised on the fact that DNA fingerprints can be used to establish whether an individual has certain genetic defects. Specifically, Shapiro warns that employers will refuse to hire individuals with certain defects, and insurance companies will similarly refuse to insure individuals based on their genetic profiles. One commentator has warned that establishment and use of genetic databases could lead to creation of a "permanently stigmatized genetic underclass."¹² Supporters of a national and state DNA databanks argue that safeguards can be instituted to ensure that DNA fingerprints will be used for law enforcement purposes only and will otherwise be kept confidential.¹³

THE DNA TESTS

Despite these concerns, it appears that DNA testing will be used increasingly in Virginia criminal cases. Note that the new technology can be utilized by criminal defense attorneys as well as prosecutors. Defense attorneys can introduce DNA test results in an effort to exculpate their

⁹ The New York Times, Aug. 15, 1989, § B, at 1, col. 4; *see* *People v. Castro*, 545 N.Y.S.2d 985 (1989).

¹⁰ The New York Times, Aug. 15, 1989, § B, at 1, col. 4.

¹¹ *Nightline*: Interview with Judge William Sessions, FBI Director; Justice Gerald Sheindlin, New York Supreme Court; and Donald Shapiro, New York Law School (ABC television broadcast, Aug. 15, 1989).

¹² Marx, *Now the Techno-Snoopers Want To Get Into Our Genes*, L. A. Times, Sept. 15, 1989, Metro Section, at 7. Gary T. Marx is a sociology professor at the Massachusetts Institute of Technology.

¹³ *Nightline*, *supra* note 11.

clients. Attorneys working in the criminal justice field should be familiar with the scientific procedures involved in DNA fingerprinting.

Commercial laboratories currently offer three different tests for typing or fingerprinting DNA. The best known test is offered by Lifecodes Corporation of Valhalla, New York, and is called the "DNA-Print" test. A second test is known as "DNA fingerprinting" and is performed by Cellmark Diagnostics Corporation of Germantown, Maryland. The third DNA typing test was developed by the Cetus Corporation and is offered by Forensic Science Associates of Richmond, California.

In an article entitled *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests*,¹⁴ William C. Thompson and Simon Ford provide a detailed and critical description of these testing techniques. Thompson and Ford note that all three tests are significant improvements over previous genetic identification techniques.¹⁵ Thompson and Ford stress that the theory behind DNA testing is widely accepted throughout the scientific community. DNA is a complex chain of molecules which contain heritable information passed from parents to offspring. No two individuals, except for identical twins, have identical DNA.¹⁶ DNA is structured like a ladder, with the "rungs" of the ladder consisting of pairs of molecules known as "bases." Four different kinds of bases exist, their order on the ladder constituting a "DNA sequence." DNA typing developed when scientists discovered how to identify variable or "polymorphic" sections of the DNA ladder, which identify differences among individuals.¹⁷

The Cellmark and Lifecodes tests analyze polymorphic DNA segments using a seven-step scientific procedure known as "RFLP" analysis.¹⁸ Thompson and Ford note that the reliability of RFLP analysis can be undermined where DNA samples have become contaminated with chemical or biological agents.¹⁹ Accordingly, they call for additional research to test the reliability of RFLP analysis where samples have been contaminated.²⁰ The authors also point out that most of the procedures involved in the seven-step analysis are well accepted by scientists. Because the

¹⁴ Thompson and Ford, *supra* note 8.

¹⁵ *Id.* at 51.

¹⁶ *Id.* at 41.

¹⁷ *Id.* at 62-63.

¹⁸ "RFLP" stands for "restriction fragment length polymorphism."

¹⁹ Thompson and Ford, *supra* note 8 at 66.

²⁰ *Id.* at 68-69.

procedures are complicated, however, there is significant room for laboratory error. The authors state that most of the validation studies of DNA testing have been conducted by experts who are employed by the companies marketing the tests. They call for additional validation studies by independent experts.²¹

The Cetus test is a newer technique which determines whether polymorphic DNA segments are present in a given sample. This differs from the RFLP analysis, which measures the length of the segments.²² Unlike the Cellmark and Lifecodes tests, the Cetus test can type the DNA of a single human hair.²³ According to Thompson and Ford, however, under a Cetus test procedure known as "polymerase chain reaction," or "PCR," DNA samples are susceptible to contamination.²⁴

Once samples have been typed for DNA, a laboratory analyst must determine whether a "match" has occurred. Although no two individuals have identical DNA, they can have the same DNA type.²⁵ Scientists must determine, based on the pattern of DNA prints, the probability that two unrelated individuals would have matching DNA patterns. Some scientists have conducted population studies to estimate the frequency of certain DNA patterns within a given population. These figures are then used to determine the probability of a coincidental match between DNA prints.²⁶ In the *Spencer* cases cited above, experts testified that the odds were one in 705 million and one in 135 million that an individual other than Spencer had the same DNA type as that found in the recovered samples.²⁷

CONCLUSION

Prosecutors and criminal defense attorneys in Virginia should be familiar with the technical aspects of DNA testing and its potential weaknesses. An attorney who has a basic understanding of DNA fingerprinting will be better prepared to conduct an effective examination of expert witnesses, and to argue for or against the admissibility of DNA test results, in a given trial.

²¹ *Id.* at 73.

²² *Id.* at 76.

²³ *Id.* at 50.

²⁴ *Id.* at 77.

²⁵ *Id.* at 80.

²⁶ *Id.* at 81-86.

²⁷ Richmond Times-Dispatch, Sept. 23, 1989, § B, at 1, col. 6.

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