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DNA Fingerprinting: Is It Ready for Trial?

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DNA Fingerprinting: Is It Ready for Trial?

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I. INTRODUCTION

There is a tendency for society to blindly accept new technology, especially technology designed to enhance the quality of life. In our increasingly crime-burdened cities, people jump at methods that can identify perpetrators conclusively. Deoxyribonucleic Acid (DNA) technology, when used correctly, allows for unquestioned identification of evidentiary samples recovered from crimes scenes when compared to samples from a defendant.¹ As no two people, other than identical twins, have the same genetic structure,² DNA fingerprinting tests, when properly conducted, provide the mechanism through which this technology may be applied.

Although the theory supporting DNA fingerprinting is generally accepted as capable of producing extremely reliable results,³ and there is little doubt as to the revolutionary effect DNA fingerprinting could potentially have on paternity and criminal cases,⁴ the process followed in obtaining the results must be carefully examined. Therefore, a New York court in the case of *People v. Castro*,⁵ correctly and wisely pulled in the reigns on the use of DNA fingerprinting analysis in the courtroom by refusing to admit DNA fingerprinting tests into evidence in a murder trial.

The theory and technology of DNA fingerprinting far surpass everyday knowledge. In fact, only those specifically trained in molecular biology and chemistry can even begin to understand the concepts

1. Thompson & Ford, *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests*, 75 VA. L. REV. 45, 46 (1989).

2. G. ALEXANDER, *GENERAL BIOLOGY* 504 (1962).

3. Lewin, *DNA Fingerprinting on the Witness Stand*, 244 SCIENCE 1033 (1989).

4. *Id.*

5. *People v. Castro*, 144 Misc. 2d 956, 540 N.Y.S.2d 985 (Sup. Ct. 1989).

involved.⁶ Traditional fingerprinting, by comparison, involves a fairly simple visual comparison.⁷ Similarly, most of us are at least aware of the various blood types that exist in the population and are capable of viewing such evidence with only a minimal risk of dangerous prejudice. These scientific techniques can be easily verified by the court involved.⁸ However, DNA fingerprinting evidence cannot be verified by the court and, thus, requires a "total reliance on the expert's assumptions."⁹

DNA fingerprinting is not a common procedure. Additionally, the probabilities involved, for example one in 189,200,000, effectively serve as a death knell to defense cases.¹⁰ Scientific evidence can "assume a posture of mystic infallibility in the eyes of a jury of laymen."¹¹ This "aura of scientific infallibility may shroud the evidence and thus lead the jury to accept it without critical scrutiny."¹²

This Comment examines the role DNA fingerprinting has assumed in the legal community and the potential problems that accompany it as it moves from the laboratory to the courtroom. Section II provides a brief overview of the theory behind DNA fingerprinting, standards for the admissibility of novel scientific evidence as set forth by the United States Court of Appeals for the District of Columbia in *Frye v. United States*,¹³ and, in particular, the application of those standards to the admission of DNA fingerprinting evidence. Section III focuses on *Castro* and the important shift it provides in the examination of DNA fingerprinting by narrowing the question of admissibility to the application, as opposed to the existence, of generally accepted theories and techniques. Section IV provides standards by which to judge DNA fingerprinting evidence in future cases to ensure that its admissibility as a probative tool is not abused and that irregularities in testing procedures will be uncovered. Section V concludes that DNA fingerprinting is a technique that is and will continue to be a powerful evidentiary tool—provided that it is subject to

6. Thompson & Ford, *supra* note 1, at 56.

7. See Gianelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half-Century Later*, 80 COLUM. L. REV. 1197, 1200-02 (1980). The science of fingerprint comparison typically involves visual inspection of sets of fingerprints and a search for similar patterns. Photographic enlargements of evidentiary fingerprints can facilitate the comparison by magnifying the similarities or differences.

8. *Id.* at 1204.

9. *People v. Marx*, 54 Cal. App. 3d 100, 110, 126 Cal. Rptr. 350, 356 (1975).

10. Thompson & Ford, *supra* note 1, at 56.

11. *United States v. Addison*, 498 F.2d 741, 743 (D.C. Cir. 1978).

12. Gianelli, *supra* note 7, at 1237.

13. 293 F. 1013 (D.C. Cir. 1923).

strict scrutiny regarding the appropriate standards and procedures used in each particular test conducted.

II. OVERVIEW

A. *History of DNA Fingerprinting*

DNA, deoxyribonucleic acid, is a long chain of molecules found in the nucleus of most cells of all living organisms.¹⁴ Each chain is arranged in a ladder-like configuration in which nucleotide base pairs form the rungs.¹⁵ There are only four different bases in DNA which bind to form the base pairs, yet the order in which these base pairs are arranged along the ladder is different in the DNA of every human being.¹⁶ A single molecule of DNA may have as many as three billion base pairs, or rungs, providing a virtually infinite set of DNA molecules.¹⁷ Within a given person, however, the order of the base pairs is the same in every cell of the body.¹⁸ It is this premise on which DNA fingerprinting is based. Evidentiary samples found at crime scenes (i.e., blood stains, hair, or semen) that contain DNA, therefore, contain information that can positively identify the source of the sample.¹⁹ Scientists have developed techniques which allow the DNA found in evidentiary samples to be compared to the DNA of a victim or a defendant.²⁰

14. G. ALEXANDER, *supra* note 2, at 48.

15. *Id.* at 504.

16. *Id.* at 49.

17. *Id.*

18. *Id.*

19. *Id.*

20. Thompson & Ford, *supra* note 1, at 50, 64-80. The techniques produce autoradiographs, or "autorads," which are, in essence, pictures of the DNA that is fingerprinted. Scientists compare the autorads of the evidentiary sample to an autorad of genetic material obtained from an individual to determine if there is a match. Autorads are generated by a ten-step process, briefly described below:

1. Extraction of DNA: The evidentiary sample is exposed to chemicals and enzymes. The cells are burst open releasing the DNA contained therein. The DNA is then chemically separated from the other cell material.

Id. at 65.

2. Digestion: The separated DNA is exposed to restriction enzymes, specific proteins that recognize base pair sequences in the separated DNA and "cut" the DNA strands at all the places along the DNA strand where the base sequence exists. This process produces various length DNA strands known as Restriction Fragment Length Polymorphisms, or RFLPs. Two different samples of DNA originating from the same source will produce RFLPs that are the same length in each sample. The RFLPs produced in samples from different sources will be different in length and number.

Id. at 67-68.

3. Gel Electrophoresis: The RFLPs are then sorted according to size by gel electrophoresis. In this process, an agar gel is placed in an electric field. The

In this sense, DNA fingerprinting is similar to its namesake,

RFLPs from the samples to be compared are then placed in lanes at the negatively charged end of the gel. Since DNA is negatively charged, the RFLPs will migrate to the positively charged end of the gel. The shorter the RFLP, the easier it can move through the gel, and thus, the RFLPs are separated by size as they migrate. After an appropriate time, the gel is removed from the electric field, trapping the different length RFLPs at different spots in the gel.

Id. at 69-70.

4. Staining: The gel is treated with an Ethyidium Bromide stain which the DNA absorbs. Exposure to ultraviolet light will then reveal the position of DNA on the gel.

Id. at 70.

5. Denaturation: The stained DNA in the gel is exposed to chemicals that denature it. That is, the chemicals split the double helix configuration of the DNA molecules into two, separate, single strands.

Id.

6. Blotting: In a technique known as "Southern Transfer," a nylon membrane is placed in contact with the agar gel. The RFLPs in the gel are transferred to the membrane in exactly the same position relative to each other that they occupied on the gel.

Id. at 70-71.

7. Hybridization: The denatured (single strand) RFLPs are exposed to radioactively marked probes. Probes are small, single-stranded DNA chains of a known sequence. They will attach to their complimentary sites on the RFLPs wherever that complimentary site exists. Where the complimentary site is not found, no hybridization occurs. Then the membrane is then washed and exposed to different probes, marking additional spots on the RFLPs.

Id. at 71-74.

8. Autoradiograph: The membrane containing the now radioactively marked RFLPs from the samples to be compared are placed on film. The radioactively marked RFLPs expose the film producing bands. This exposed film is called an autoradiograph.

Id. at 74.

9. Interpreting the Autoradiograph: The exposed film is then visually examined to compare the bands present in different lanes. If the lanes contain samples originating from the same source, the autorad should show bands of the same size and number in the same location in each lane. If the samples originate from different sources, the bands will appear at different locations in each lane. The bands are then measured manually or by a digitizer attached to a computer to determine if they are indistinguishable.

Id. at 74-76.

10. Population genetics: Should the lanes show a match, the results must be analyzed according to the principles of population genetics to determine the frequency of such a match occurring in the general population. The application of population genetics is not necessary if no match is observed as the samples would be excluded as originating from the same source. For example, if the bands that matched were known to show the existence of the A blood type allele in the source, the results would not be very helpful when taken alone as approximately 40% of the general public would show a similar match. Alternatively, if a match is declared for an allele that is present in only .000001% of the population, the test is tremendously helpful as the odds that a match occurred coincidentally are greatly reduced. The more alleles tested, the smaller the chance that observed matches were due to coincidence.

traditional fingerprinting. For over 100 years, law enforcement agencies have recognized traditional fingerprinting as an infallible method of identification because of the unique pattern of each fingerprint.²¹ However, fingerprints may be difficult or impossible to recover at a crime scene, or the defendant may explain their presence as innocent. For example, a neighbor charged with murder could explain his fingerprints in the bedroom of the murder victim as the result of assisting the victim with a recent furniture move.²²

The British geneticist Alec Jeffreys first developed the techniques employed in DNA fingerprinting.²³ Originally, these techniques helped scientists pinpoint the locations of specific genes in a DNA molecule.²⁴ DNA fingerprinting first was utilized in the legal arena as a tool for identifying parents in paternity suits.²⁵ Its great potential for accuracy eventually led prosecutors to use DNA fingerprinting in the identification of the source of evidentiary samples found at crime scenes.²⁶ These attempts raised the question of the applicable standards in determining the admissibility of DNA fingerprint based evidence.

B. *The Frye v. United States Standard*

In 1923, the United States Court of Appeals of the District of Columbia in *Frye v. United States* ruled that a lie detector test, known as a systolic blood pressure deception test, was inadmissible as evidence in a criminal proceeding.²⁷ The *Frye* court held that this early version of a lie detector test, based on the theory that truth is spontaneous and lying requires conscious effort, was not founded on accepted scientific theory.²⁸ The holding has become the standard by which most courts judge the admissibility of novel scientific evidence.²⁹

In *Frye*, the court stated that "just when a scientific principle or discovery crosses the line between the experimental and demonstrable

Id. at 76-79.

It is this application of allele frequencies observed in the general public that leads to a conclusion. This conclusion is usually given in the form of a ratio showing the frequency of occurrence of the applicable alleles in the general public. This is the origin of the one in 189,200,000 figure presented in the Lifecodes report.

21. Gianelli, *supra* note 7, at 1220.

22. Lewin, *supra* note 3, at 1034.

23. *Id.*

24. *Id.*

25. *See, e.g., In re Baby Girl S*, 140 Misc. 2d 299, 532 N.Y.S.2d 634 (Sup. Ct. 1988).

26. Lewin, *supra* note 3, at 1034.

27. *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

28. *Id.*

29. Gianelli, *supra* note 7, at 1208.

stages is difficult to define."³⁰ The court added that "while courts will go a long way in admitting expert testimony deduced from a well recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs."³¹

General acceptance of a proposed theory or technique in the scientific community soon became the standard of admission for novel scientific evidence.³² This basic standard is still used today. Later courts, however, expanded upon the general acceptance principle and formulated a three-prong test for the determination of the admissibility of novel scientific evidence.³³

The first prong asks whether there is a generally accepted theory in the scientific community that supports the contention proposed.³⁴ The next prong asks whether there are existing techniques or procedures generally accepted in the scientific community which are capable of producing reliable results.³⁵ The final prong examines the accepted scientific procedures and techniques to insure that they are followed correctly in each particular case.³⁶

The lie detector test proposed in *Frye* failed at the first prong level. The theory that lying requires conscious effort and results in elevated blood pressure had not "gained such standing and scientific recognition among physiological and psychological authorities."³⁷ The court stated that this lack of general acceptance by the scientific community made it impossible to justify admitting the results of the test.

The County Court for Dade County, Florida, in *State v. Aguilera*,³⁸ provides an example of novel scientific evidence failing to pass the second prong. The *Aguilera* court found evidence of speeding provided by radar detection units inadmissible because the current tech-

30. *Frye*, 293 F. at 1014.

31. *Id.*

32. Gianelli, *supra* note 7, at 1201.

33. See, e.g., *Frye v. United States*, 293 F. 1013 (denying admissibility of scientific evidence where validity of underlying theory was in question); *State v. Aguilera*, 48 Fla. Supp. 207 (Dade County Ct. 1979) (denying admissibility of scientific evidence where validity of techniques used in radar detection devices was questioned in the scientific community); *State v. Vail*, 274 N.W.2d 127 (Minn. 1979) (holding that improper application of valid techniques was grounds for denying admission of drug identification tests).

34. See, e.g., *Aguilera*, 48 Fla. Supp. at 207 (finding that radar speed measuring devices in their "present" modes were not reliable "beyond and to the exclusion" of a reasonable doubt).

35. *Id.*

36. *Id.*

37. *Frye*, 293 F. at 1014.

38. *Aguilera*, 48 Fla. Supp. at 207.

nology involved was unreliable.³⁹ The court stated that the theory behind radar detection of speeding had reached a level of general acceptance in the scientific community, thus satisfying the first prong. The court added, however, that the reliability of the devices "has not been established beyond and to the exclusion of every reasonable doubt."⁴⁰ In other words, the second prong was not satisfied because the techniques used to apply the accepted theory were not reliable. As technology improved and techniques approached theory, the second prong obstacle was no longer a valid objection to the use of radar speed detection evidence. These technological advancements have forced any objections to radar evidence to be based on the third prong issue of application of acceptable techniques—i.e., correct operation of the radar gun.

Similarly, in *State v. Vail*,⁴¹ the Minnesota Supreme Court held that certain drug testing techniques were unreliable, and that the use of those techniques to identify controlled substances was inadmissible. Though the theory existed in the scientific community that would allow for the identification of controlled substances, the second prong was not met where the techniques employed could not identify the tested substance beyond a reasonable doubt.⁴² Expert testimony suggested that the thin layer chromatography tests used to identify drug samples as marijuana were not appropriate because the chemicals used in the technique provided an error rate that was unacceptable regardless of whether or not the proper procedures were followed.⁴³ The reliability of the techniques was insufficient to positively identify the tested substances.⁴⁴

In essence, once the first two prongs are satisfied, admission of novel scientific evidence becomes and remains a third prong question in all cases. Assuming the same techniques are employed, admission simply becomes a question of application. The court must examine each particular case to determine if the proper techniques were followed. An example of failing the third prong is provided by *United States v. Ridling*.⁴⁵ The *Ridling* court suggested that even if a generally accepted theory existed and acceptable procedures were available, a test would be unreliable (and its results inadmissible) where, for instance, the scientific procedure required the use of machines and the

39. *Id.* at 208.

40. *Id.* at 210.

41. *State v. Vail*, 274 N.W.2d 127 (Minn. 1979).

42. *Id.* at 134.

43. *Id.* at 133.

44. *Id.*

45. *United States v. Ridling*, 350 F. Supp. 90 (E.D. Mich. 1972).

machines used were not in "good operating condition"⁴⁶ or were not used "properly"⁴⁷ by the technician. Here, the scientific evidence would fail the third prong because the otherwise accepted techniques were applied improperly.

C. *Frye Applied to DNA Fingerprinting*

The few courts that addressed this issue prior to *Castro* all found DNA fingerprinting admissible. In New York, three trial courts have examined the issue though the problem has yet to reach the appellate level.⁴⁸ An appellate court in Florida has found DNA fingerprinting admissible.⁴⁹ A Maryland appellate court⁵⁰ and the Superior Court of the state of Washington⁵¹ have reached similar conclusions. Additionally, the Alabama Court of Criminal Appeals reported that "at least nine other states had admitted DNA evidence at trial."⁵²

The admissibility of DNA fingerprinting has been challenged by objections based on various levels of the *Frye* test. The second and third prongs have been the most common subjects of objections; however, most third prong objections have been either misunderstood or poorly argued and actually have been decided on second prong grounds.⁵³ This dilemma in all likelihood has been the downfall of the objection.

*Andrews v. State*⁵⁴ was one of the first criminal cases in which DNA fingerprinting evidence was introduced against a defendant. The court admitted the evidence, stating that "DNA print identification appears based on proven scientific principles."⁵⁵ The court added that the testing laboratory employed "accepted scientific techniques."⁵⁶ Testimony given by scientists employed by the testing laboratory suggested that those techniques were followed in *Andrews*.⁵⁷

46. *Id.* at 93.

47. *Id.*

48. *People v. Lopez*, N.Y.L.J., Jan. 6, 1989, at 29, col. 1 (N.Y. Sup. Ct.); *People v. Wesley*, 140 Misc. 2d 306, 533 N.Y.S.2d 643 (Sup. Ct. 1988); *In re Baby Girl S*, 140 Misc. 2d 299, 532 N.Y.S.2d 634 (Sup. Ct. 1988).

49. *Andrews v. State*, 533 So. 2d 841 (Fla. Dist. Ct. App. 1988) (admitting DNA fingerprinting evidence for identification purposes), *rev. denied*, 542 So. 2d 1332 (Fla. 1989).

50. *Yorke v. State*, 315 Md. 578, 556 A.2d 230 (1989).

51. *State v. Cauthron*, No. 88-1-1-012533 (Wash. Sup. Ct. Jan. 18, 1989).

52. *Kennedy v. State*, 545 So. 2d 214 (Ala. Crim. App.), *cert. denied*, 110 S. Ct. 258 (1989).

53. *See, e.g., Andrews*, 533 So. 2d at 841.

54. *Id.* at 843.

55. *Id.* at 850.

56. *Id.* at 851.

57. *Id.* at 847.

Thus, the court concluded that all three prongs of the *Frye* test were satisfied and admitted the evidence.

A closer look at *Andrews* suggests that the second prong was, in actuality, the only one questioned. Defense attorneys argued that a gel used in the test was unproven, bringing into question the general reliability of the techniques employed by the testing laboratory.⁵⁸ The defense did not object to how these techniques were applied, however, despite the complete absence of unbiased evidence to show that the testing lab properly adhered to accepted procedure in this case. Only one expert who testified was not an employee of the testing laboratory, and thus, presumptively unbiased. This expert confirmed that the techniques claimed by the laboratory were acceptable, but added that he was not present when the particular test in question was performed.⁵⁹ His absence made it impossible for him to comment on prong three criteria. Thus, it appears that the court based its decision to admit the DNA fingerprinting evidence solely on satisfaction of prong two concerns.⁶⁰

Other attacks on DNA admissibility have also focused on prongs one and two. In *People v. Wesley*,⁶¹ defense attorneys opposed the admission of DNA fingerprint evidence on two grounds. First, the laboratory's "procedures, methodology, and quality controls [were] not adequate to assure reliability and accuracy of its results."⁶² Second, the laboratory's "population studies [were] inadequate to establish a claimed power of identity for its results."⁶³ Again, these claims focus on DNA technology generally, challenging admissibility by questioning the acceptability of the techniques employed. The defense made no attempt to challenge on third prong concerns, such as error in the mechanical application of existing, appropriate techniques.⁶⁴

These cases demonstrate that attacks addressed at the first and second prongs are generally futile.⁶⁵ *Andrews* and *Wesley* focused on these issues, and the tests were admitted, in accordance with the vir-

58. *Id.* at 849.

59. *Id.* at 847.

60. *Id.*

61. *People v. Wesley*, 140 Misc. 2d 306, 317, 533 N.Y.S.2d 643, 650 (Albany County Ct. 1988).

62. *Id.* at 307, 533 N.Y.S.2d at 644.

63. *Id.*

64. *Id.*

65. See generally *Kennedy v. State*, 545 So. 2d 214 (Ala. Crim. App.), cert. denied, 110 S. Ct. 258 (1989); *Yorke v. State*, 315 Md. 578, 556 A.2d 214 (1989); *State v. Cauthron*, No. 88-1-1-012533 (Wash. Sup. Ct. Jan. 18, 1989).

tual unanimity of the scientific community.⁶⁶ The theory behind DNA fingerprinting is unquestioned in the scientific community.⁶⁷ Additionally, there is no dispute that testing laboratories have developed reliable DNA fingerprinting techniques.⁶⁸

However, under the *Frye* three-tiered analysis, the general acceptance of theory and technique is insufficient alone to justify the admission of novel scientific evidence.⁶⁹ The third prong of the *Frye* test demands that appropriate techniques must be applied correctly each time a particular test is performed. *People v. Castro*⁷⁰ provided the first successful challenge to the admissibility of DNA fingerprinting evidence by concentrating on the third prong—clearly the appropriate focus for examination of DNA fingerprinting evidence in criminal trials.

III. *PEOPLE V. CASTRO*

On February 5, 1987, Vilma Ponce, at the time seven months pregnant, and her two-year-old daughter were stabbed to death in New York City.⁷¹ Police later arrested Joseph Castro, charged him with the crime, and seized his wristwatch which appeared to be splattered with blood.⁷²

Prosecutors attempted to identify the blood on Castro's wristwatch through DNA fingerprinting tests performed by the Lifecodes Corporation.⁷³ Lifecodes' testing report stated that the DNA from the blood sample matched Vilma Ponce's DNA and that the frequency of such a match in the general public was only one in 189,200,000.⁷⁴ Defense attorneys objected to the admission of the Lifecodes report on the grounds that, in this instance, Lifecodes failed to follow the generally accepted techniques needed to ensure reliability.⁷⁵ A twelve-week-long *Frye* hearing resulted in the first successful challenge to the introduction of DNA fingerprinting evidence in an American court.

The success of the challenge resulted from its focus on the third prong of the *Frye* test. Defense attorneys apparently realized that

66. Gianelli, *supra* note 7, at 1220.

67. Thompson & Ford, *supra* note 1, at 50.

68. *Id.* at 54.

69. *See, e.g.*, *United States v. Ridling*, 350 F. Supp. 90 (E.D. Mich. 1972).

70. 144 Misc. 2d 956, 980, 545 N.Y.S.2d 985, 999 (Sup. Ct. 1989).

71. N.Y. Times, August 15, 1989, at B1, col. 1.

72. *Id.*

73. *Id.*

74. Lewin, *supra* note 3, at 1034.

75. N.Y. Times, *supra* note 71, at B1, col. 1.

prong one and two objections were fruitless. Therefore, they prevented the discussion from lapsing into first or second prong issues by providing sufficient evidence of Lifecodes failures to follow accepted procedures.⁷⁶ For instance, the defense pointed out that blood samples from Castro's watch were aseptically obtained and most likely included bacterial contaminants; at least one of the Lifecodes' conclusions was ruled inadmissible because of the possibility that the sample had been degraded by bacterial exposure. The defense also challenged Lifecodes' failure to provide both male and female "control lanes" in a test to determine the gender of the sample's source. Other procedural errors raised by the defense cast serious doubt on Lifecodes' conclusion that the blood on Castro's watch indeed was the blood of Vilma Ponce. Accordingly, the court rejected the DNA fingerprinting evidence.

It is noteworthy that the defense in *Castro* did not challenge underlying theories or the availability of reliable techniques, tacitly conceding that DNA fingerprinting is accepted in the scientific community to the point that it no longer requires first or second prong analysis. Rather, the defense focused on potential problems resulting from the failure to follow accepted procedures. The court accepted this approach, and confined its analysis to prong three issues.

Moreover, recognizing that discovery of procedural errors may be extremely difficult, the *Castro* court provided for extensive discovery to ensure that specific data concerning test techniques are available to the non-introducing party.⁷⁷ First, the party who intends to introduce DNA fingerprint evidence must give notice of that intent as early as possible.⁷⁸ Second, the party seeking to admit test results must provide the non-introducing party with: (1) true copies of all autoradiographs⁷⁹ run and an opportunity to examine the originals; (2) copies of laboratory books; (3) copies of control tests run on the material utilized; (4) copies of the reports developed by the testing laboratory describing the methods used to declare a match or non-match of samples, with size measurements and statistical information if applicable; (5) copies of the report developed by the testing laboratory which was given to the proponent; (6) a statement by the testing laboratory describing the methods used to calculate the allele frequencies in the relevant population; (7) a copy of the data pool for each loci examined; (8) a certificate by the testing laboratory that the

76. *People v. Castro*, 144 Misc. 2d 956, 974, 545 N.Y.S.2d 985, 996 (Sup. Ct. 1989).

77. *Id.*

78. *Id.*

79. *See supra* note 20 and accompanying text.

method used to declare a match was the same used to determine the allele frequency in the population; (9) a statement of any contaminants and the tests performed to determine their origin; and (10) a statement describing any observed defects or laboratory errors and the laboratory's explanation thereof.⁸⁰

Short of having an expert present to witness the testing procedures, the opportunity to examine the autorads provides the best protection against unreliable tests, and should reveal any potential problems with them.⁸¹ Because mistakes in procedures that are not apparent through examination of the autorads usually results in blank autorads, the interests of the non-introducing party would be sufficiently safeguarded.⁸² If shortcuts have been taken by the testing laboratory, they would be apparent to an expert at this juncture. Thus, the extensive discovery mandated by the *Castro* court provides the non-introducing party with an opportunity to refute the reliability of the tests, and ensures access to the factual data necessary to mount a successful third prong challenge.

Castro cuts to the heart of the potential problems with DNA fingerprinting. Though, in fairness to earlier courts, *Castro* was made easier by a statement provided by a conference attended by experts provided by both the prosecution and defense. Although unprecedented, the court's decision to allow the conference met squarely with the interpreted purpose of *Frye*-type hearings. Courts have read *Frye* to say that the requirement of general acceptance of the proposed technology in the scientific community "assures that those most qualified to assess the general validity of a scientific method will have the determinative voice."⁸³

The statement produced by the conference of experts plainly indicated that the tests sought to be admitted in *Castro* were fraught with numerous problems.⁸⁴ However, these problems did not involve

80. *Castro*, 144 Misc. 2d at 978, 545 N.Y.S.2d at 999.

81. See generally *id.* at 973-79, 545 N.Y.S.2d at 995-99.

82. *Andrews v. State*, 533 So. 2d 841, 849 (Fla. Dist Ct. App. 1988).

83. *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1978).

84. *Castro*, 144 Misc. 2d at 974, 545 N.Y.S.2d at 996-98. The tests performed by Lifecodes presented numerous problems. To start, the blood stains on the watch were aseptically obtained and probably included bacterial contaminants. *Id.* Adequate controls were not used to ensure that the DNA bands that provided the basis for conclusion of the tests were not of bacterial origin. *Id.* As well, an autorad used to declare a match by Lifecodes was declared inadmissible because testing was inadequate to determine whether a band present on the watch sample lane was a true homozygous band or a heterozygous band that had been degraded by bacterial exposure. *Id.*

Additionally, efforts to determine the sex of the source of the blood sample were inconclusive as scientifically accepted procedures require both male and female control lanes to assure the procedures worked correctly. *Id.* In the instant case, the autoradiograph run to

the underlying theory or the availability of reliable techniques to effectually utilize those theories. The problems resulted from a failure to follow the accepted procedures. This focus demonstrates the importance of the *Castro* ruling. DNA fingerprinting has reached such a level of acceptance in the scientific community that it no longer requires first or second prong analysis. These methods are accepted now and will remain accepted absent a rediscovery of the wheel. However, the problem still remains that the discovery of such errors may be extremely difficult. In order to address this concern and to lessen the prejudicial nature the tests may have, *Castro* provides extensive standards which can minimize the risks.⁸⁵

IV. ADDRESSING THE PREJUDICIAL NATURE PROBLEM

As the defense conceded in *Castro*, DNA fingerprinting has made the transition from unproven theory to accepted scientific procedure and practice. The ready acceptance of the theory underlying DNA fingerprinting in the scientific community, and the fact that reliable techniques exist, have moved this technology past the first two prongs of the *Frye* test. In this sense, those doors have been shut and need not be reopened. Now, practitioners must place their emphasis on whether the testing laboratories have followed the accepted procedure in each case.

The acknowledgement of DNA fingerprinting as a viable technology, however, presents its own evidentiary problem: the prejudicial impact of evidence cloaked in the mantle of high technology and scientific respectability. The *Castro* court attempted to minimize this impact by focusing narrowly on the third prong of the *Frye* test. In

determine the sex of the sample did not contain a male control lane and thus was unacceptable. *Id.* Later autorads that included a male control lane could not be used as a control for earlier tests as inherent experimental differences may render tests run separately useless for comparison. *Id.*

Further, an autoradiograph performed using what is commonly known as "Cooke's probe" also presented admissibility problems. *Id.* This autorad showed five bands of DNA in the watch blood sample lane and only three in the victim's blood control lane. *Id.* Though Lifecode's expert testified that the additional two bands were "most likely bacterial or plasmid bands," failure to conduct further experiments failed to eliminate the possibility that these bands were human DNA which would have proven conclusively that the watch blood sample did not originate from Vilma Ponce. *Id.*

Additionally, it was apparent that Lifecodes was not using the appropriate allele frequencies when calculating the probability that a match occurred coincidentally. *Id.* The laboratory may have used the probabilities calculated from computer-determined matches in instances where a match was declared visually. *Id.* While visually declared matches present no problem alone, the appropriate frequencies are larger for visual matches than computer-declared matches. *Id.* Thus, if computer frequencies were used for visually declared matches, the final probability—in this case 1 in 189,200,000—would be grossly mistated. *Id.*

85. *Id.* at 978, 545 N.Y.S.2d at 999.

theory, this focus would limit objections to prong three issues, and make it impossible for the discussion to shift back to prongs one and two. However, the *Castro* court did not stop at merely narrowing the inquiry to prong three issues. As an additional safeguard against the prejudicial impact of novel scientific evidence, the *Castro* court placed the burden of proving that prong three criteria were met upon the introducing party. In other words, DNA fingerprint evidence will not be admitted unless the introducing party first satisfies the court that proper testing procedures were followed.

Opponents to this contention claim that it is better to admit novel scientific evidence and let the jury determine its relative worth. In *United States v. Baller*,⁸⁶ the United States Court of Appeals for the Fourth Circuit reported that it is better to "admit relevant scientific evidence in the same manner as other expert testimony and allow its weight to be attacked by cross-examination and refutation."⁸⁷ Under this approach, all conclusions presented by the testing laboratory are admissible. The opponent would then have the opportunity to refute and rebut the expert's claims. While this theory may apply where traditional fingerprinting or blood typing is involved, its efficacy is questionable when more complex procedures are involved.⁸⁸ As Gianelli notes in discussing polygraph test admissibility, "empirical support for this view is lacking . . . [and] the assumption of jury culpability provides a shaky foundation upon which to construct an approach to the admissibility of novel scientific evidence."⁸⁹

One can argue that, while not perfect, even unreliable tests have some probative value. In *Castro*, the conclusions of the experts were not induced fraudulently or obtained by mistaken interpretation or scientific error.⁹⁰ In fact, the original conclusions of the experts may well have been correct. Defense experts based their objections to the findings on certain procedural lapses which left open the possibility of other interpretations.⁹¹ The fact that a procedural lapse was uncovered does not necessarily suggest that the claimed scientific findings were wrong, just that the results were not as reliable as possible.⁹² Claims by experts that additional bands were probably of bacterial origin were not necessarily incorrect. However, they did not exclude

86. 519 F.2d 463 (4th Cir.), cert. denied, 423 U.S. 1019 (1975).

87. *Id.* at 466.

88. Gianelli, *supra* note 7, at 1220.

89. *Id.* at 1222.

90. *People v. Castro*, 144 Misc. 2d 956, 978-80, 545 N.Y.S.2d 985, 998-99 (Sup. Ct. 1989).

91. *Id.* at 980, 545 N.Y.S.2d at 999.

92. *Id.*

this possibility.⁹³

Also, the tests themselves provide certain safeguards inherent in the procedures. Expert testimony in *Wesley* suggests that "it is impossible under the scientific procedures of DNA fingerprinting . . . to get a 'false positive'—i.e., to identify the wrong individual as the contributor of the DNA being tested."⁹⁴ "If the tests were performed improperly . . . no result at all would be registered."⁹⁵

Additionally, all other errors cited in *Castro* dealt with the failure to exclude alternative possibilities, not that the announced findings were inherently wrong.⁹⁶ Certainly, the court could have admitted the evidence and permitted the jury to determine its worth in light of defense expert's claims that the tests were inconclusive. However, courts have excluded this alternative where exaggerated public opinion of a particular technique's accuracy makes its use prejudicial or likely to mislead the jury.⁹⁷ For example, in this particular instance, it seems highly unlikely that a group of non-scientist jurors hearing refutation evidence which suggests that apparent homozygous band matches may in actuality be a false positive because of the possibility of bacterial degradation of truly heterozygous bands, can successfully and intelligently process such information to overcome a prosecution's simple assertion that chances are one in 189,200,000 that the blood on defendant's watch came from someone other than the victim.⁹⁸

Furthermore, the techniques employed by testing laboratories are frequently difficult to review. After all, these laboratories are in business to make money, and in-depth scrutiny of the particular procedures involved can make years of secret, not to mention expensive, research available to competing labs. Expert witnesses with firsthand knowledge as to the performance of the appropriate techniques usually work for the laboratory whose process is being questioned, and judicial acceptance of a particular technique could lead to an economic windfall for the scientists. Experts who are disinterested and impartial frequently are not used.⁹⁹ At the very least, the specter of bias and partiality exists.¹⁰⁰

93. *Id.*

94. *People v. Wesley*, 140 Misc. 2d 306, 310, 533 N.Y.S.2d 643, 645-46 (Albany County Ct. 1988).

95. *Id.*

96. *Castro*, 144 Misc. 2d at 969, 545 N.Y.S.2d at 999.

97. *United States v. Baller*, 519 F.2d 463, 466 (D.C. Cir. 1975).

98. *See generally Castro*, 144 Misc.2d at 956, 545 N.Y.S.2d at 985.

99. *Thompson & Ford*, *supra* note 1, at 60.

100. *Id.*

Additionally, these experts are for the most part scientists and not lawyers. Scientific theory and experimental method often use different standards than those which are appropriate for judicial proceedings.¹⁰¹ Where reasoned scientific guesses are made in the furtherance of research and experimentation, their reliability can be checked by further experimentation and errors are frequently uncovered.¹⁰² When these same guesses are made in an unchecked DNA fingerprint test, possible errors are likely to remain hidden.¹⁰³ Typically, the only results which get additional attention from the attending scientists are those that are inconsistent with the prosecution's theory of the case.¹⁰⁴

Despite these criticisms, it is important to stress that neither the theme of this Comment nor the *Castro* court's reasoned opinion suggests that DNA fingerprinting is an evil which has no place in American jurisprudence. On the contrary, the tremendous potential these tests have for solving cases with an impressive degree of certainty should be exploited. At the same time, the introduction of innovative scientific techniques to the courtroom undoubtedly creates its share of problems. As demonstrated by the scientific experts and the court in *Castro*, these problems can be addressed squarely, with honesty and integrity. However, the courts must keep in mind that the aura of scientific certainty that accompanies DNA fingerprinting technology can also work to the undeserved prejudice of the defendant.

A potential problem that surfaces in *Castro* is revealed in the court's statement that DNA fingerprinting tests are "presently reliable and will remain so for the next six months."¹⁰⁵ Taken at face value, and possibly out of context, this statement contradicts the important point that the remainder of the decision makes.¹⁰⁶ By stating that the techniques will remain reliable for only six months, the court suggests that the techniques involved can still be questioned and that the admissibility focus remains at the second prong. If this is what was intended, the opinion loses its appeal. Alternatively, a more plausible explanation of the statement, and one that fits within the theme of the remainder of the opinion, is that these techniques will remain state of the art for the next six months. Even though better tests may be developed at that point, the reliability of the present tests is not questioned.

101. Gianelli, *supra* note 7, at 1220.

102. *Id.*

103. *Id.*

104. Thompson & Ford, *supra* note 1, at 56.

105. *People v. Castro*, 144 Misc. 2d 956, 973, 545 N.Y.S.2d 985, 995 (Sup. Ct. 1989).

106. *Id.* at 960, 545 N.Y.S.2d at 987-88.

V. CONCLUSION

Castro has made a statement concerning the status of DNA fingerprinting in the courtroom. It is possible that our desire to fight the war on violent crime has caused us to force this new technology on the system before the judiciary has had the opportunity to develop appropriate methods to insure its proper use. Nevertheless, DNA fingerprinting is here to stay and its enormous potential as a probative tool should be harnessed correctly. Theory and technology are no longer the appropriate points from which to attack these tests; recent case law clearly demonstrates that DNA fingerprinting technology satisfies the first and second prongs of the *Frye* analysis. *Castro* provides a clear directive that DNA fingerprint evidence will be admitted once the moving party shows that they were produced through the proper use of accepted techniques. The burden will then fall on the opposing party to show why the tests should not be admitted. *Castro* provides a strong procedural framework for the admission of DNA fingerprinting evidence, and puts the legal community on notice that additional study and preparation by attorneys may be needed to protect their clients from unjust prejudice.

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