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DNA FINGERPRINTING: A REVOLUTIONARY TECHNIQUE IN FORENSIC SCIENCE AND ITS PROBABLE EFFECTS ON CRIMINAL EVIDENTIARY LAW

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I. Introduction

A development in forensic science known as "DNA fingerprinting"[1] could revolutionize criminal law by enabling police to make *positive* identifications of suspects through the use of crime scene evidence.[2] The DNA fingerprinting technique matches the genetic code of a suspect's DNA molecules to the DNA fingerprint of, for example, blood found at a murder scene.[3] DNA fingerprints are obtained through a scientific process which analyzes the DNA molecules in a cell. DNA molecules exist in every cell of the human body and carry a genetic code which determines a person's characteristics. The DNA structure of a cell is unique to every individual, just like fingerprints.[4] Proponents of this new technique claim that it is capable

1. DNA stands for deoxyribonucleic acid, defined as "any of various nucleic acids that are localized especially in cell nuclei, are the molecular bases of heredity in many organisms, and are constructed of a double helix held together by hydrogen bonds between purine and pyrimidine bases which project inward from two chains containing alternate links of deoxyribose and phosphate." Websters Ninth New Collegiate Dictionary (1983). "DNA fingerprinting" is simply "a colloquialism to indicate the uniqueness to each individual of the chemical signals which show up as a series of bands on an autoradiography film." Gold, *DNA Explosion*, 137 New L.J. 1104 (1987). Lifecodes Corporation, an American company, has obtained a trademark for the process under the name "DNA-Print" Identification Technique. *See* Lifecodes Corp., *Background Information: DNA-Print Identification Test* (undated).

2. *See, e.g.*, Begley, *Leaving Holmes in the Dust*, Newsweek, Oct. 26, 1987, at 81 ("What fingerprinting was to law enforcement at the end of the 19th century, DNA analysis will be at the turn of this century and beyond"—quoting James Starrs of George Washington University); Bainham, *The Practitioner: Family Law Notes*, 137 New L.J. 613 (1987) (advent of DNA fingerprinting test has far-reaching implications); Lomax, *DNA Fingerprints—A Revolution in Forensic Science*, 83 L. Soc'y Guardian Gazette 1213 (1986) (DNA fingerprints "will revolutionize forensic science and have a major impact upon the criminal law"); Maidment, *DNA Fingerprinting*, 136 New L.J. 326 (1986) (DNA fingerprinting is an evidentiary breakthrough); Hilt, *New Crime Identification Tool Devised*, The Washington Post, Sept. 20, 1987, at A23 (technique could become one of most important tools in some types of criminal cases). While the DNA fingerprinting process will probably have a similarly dramatic impact on other areas of the law, such as paternity law, this Article will limit the scope of its review primarily to the use of DNA fingerprinting in criminal cases.

3. *See infra* text accompanying notes 17-35.

4. *DNA Fingerprinting—The Biological Blueprint*, 84 L. Soc'y Guardian Gazette 2161 (1987) [hereinafter *Biological Blueprint*] (DNA fingerprinting process shows a unique pattern in every individual; because every cell in the body has a DNA molecule unique to that body, every cell carries that body's DNA fingerprint); Maidment, *supra* note 2, at 326 (DNA fingerprint is individual-specific); *DNA Prints: A Foolproof Crime Test*, Time, Jan. 26, 1987, at 66 ("no two people (other than identical twins) have the same genetic characteristics"); Hilt, *supra*

of proving beyond a reasonable doubt whether the blood found at a crime scene is from a particular suspect.[5] Current blood identification tests only prove either that the blood found at a crime scene could not be the suspect's, or that there is a probability of some varying degree that it belongs to the suspect.[6] DNA fingerprinting differs from all other forms of blood identification tests because it can use a sample of blood, hair roots, or semen to *positively* identify the criminal.[7]

While DNA fingerprinting has the potential to become as common as regular fingerprinting,[8] it also presents courts with some difficult questions. For example, the question remains whether the DNA fingerprinting technique is sufficiently reliable and accurate to constitute admissible evidence in a criminal trial. Moreover, this new evidentiary technique necessitates a procedural approach which will preserve constitutional rights. For example, what would a court do if a suspect refused to give a blood sample? Is it a violation of the fourth amendment right against unreasonable searches and seizures to take blood from a suspect? Is it a violation of the fifth amendment privilege against self-incrimination? Does forcing a suspect to give a blood sample violate the fourteenth amendment due process clause? If DNA fingerprinting is accepted by the law enforcement community, courts will soon have to answer these questions.[9]

This Article attempts to provide a reasoned approach to the use of DNA fingerprinting in a criminal trial. Initially, this Article briefly explains

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note 2, at A23 (DNA of every human is different).

5. *See, e.g.*, Lomax, *supra* note 2, at 1213 (results of DNA fingerprinting tests reduced to absolute certainty which "vastly exceed[s] the level of proof required in either criminal or civil proceedings"); Maidment, *supra* note 2, at 326 (DNA fingerprinting can prove beyond a reasonable doubt the paternity of a person); *Family Law Update*, 137 New L.J. 469 (1987) [hereinafter *Family Law Update*] (DNA tests prove beyond reasonable doubt whether a given man is the father of the child); Hilt, *supra* note 2, at A23 (DNA fingerprinting can prove identity with virtual certainty); Time, *supra* note 4, at 66 (virtually foolproof).

6. *See, e.g.*, Maidment, *supra* note 2, at 326 (traditional blood tests have only been able to exclude those who are not the father, and can only show to a 93% probability who is actually the father); Gold, *supra* note 1, at 1104 (1987) ("conventional blood testing techniques can only conclusively exclude a man as the father"); *Family Law Update*, *supra* note 5, at 469 (conventional blood test can only provide exclusion result); Bainham, *supra* note 2, at 613 (same).

7. Bainham, *supra* note 2, at 613 (DNA fingerprinting tests may result in positive identification); Maidment, *supra* note 2, at 326 (DNA fingerprinting has advantage of providing positive proof); *Biological Blueprint*, *supra* note 4, at 2161 (DNA fingerprinting will allow positive identification); Hilt, *supra* note 2, at A23 (small sample of blood or hair can be used to identify person from whom it came with virtual certainty).

8. James A. Starrs, a lawyer and forensic expert at George Washington University, has stated that the DNA fingerprinting technique is so effective that police will establish massive DNA fingerprint files like the ones currently used for traditional fingerprinting methods. *See* Hilt, *supra* note 2, at A23.

9. These two questions, admissibility of DNA fingerprint results into evidence, and the right of police to compel suspects to submit blood samples for analysis, have been raised before. *See* Hilt, *supra* note 2, at A23.

the DNA fingerprinting technique.[10] This Article then evaluates the probative value of the new technique in light of the requirements for the admission of scientific evidence in a criminal trial.[11] This Article notes that the procedure is not yet generally accepted in the scientific community, but concludes that the necessary scientific foundation will be laid so that DNA fingerprinting will gain general acceptability. Next, this Article discusses possible constitutional implications which could result from obtaining blood samples for DNA fingerprinting from suspects. Cases are reviewed in which authorities have compelled witnesses to comply with identification methods.[12] This Article then evaluates the implications of DNA fingerprinting under the fourth amendment right to be secure from unreasonable searches and seizures, the fifth amendment privilege against self-incrimination, and the fourteenth amendment due process clause.[13] Although this Article concludes that obtaining DNA fingerprints from suspects does not violate the fourth or fifth amendment, the need to avoid police coercion of suspects mandates that suspects have the right to refuse to provide a blood sample for DNA fingerprinting analysis under the fourteenth amendment due process clause.[14] Failure to cooperate in providing a blood sample, however, should be admissible against the suspect as circumstantial evidence of guilt.[15] This approach effectuates the most equitable balance between the compelling interest in effective law enforcement and the inviolability of the human personality.

II. The DNA Fingerprinting Technique[16]

Dr. Alec Jeffreys of Leicester University discovered the DNA fingerprinting process, which has been developed with the support of the Lister Institute for Preventive Medicine.[17] Dr. Jeffreys discovered a method of mapping the sequence in each person's DNA which repeatedly occurs along the length of the string-like DNA molecule.[18] The length of the repeated

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10. *See infra* text accompanying notes 17-35.
11. *See infra* text accompanying notes 68-121.
12. *See infra* text accompanying notes 122-76.
13. *See infra* text accompanying notes 177-97.
14. *See infra* text accompanying notes 191-97.
15. *See infra* text accompanying notes 198-214.
16. This author does not have a scientific background and does not represent this Article to be a rigorous evaluation of the scientific validity of the DNA fingerprinting process. The purpose of this section and the following section is only to introduce the lay reader to the essential characteristics of this new scientific development in the hope that it heightens awareness. Rigorous dissection and evaluation of the scientific validity of the DNA fingerprinting process shall be left to better qualified authors who deal with this subject.
17. *See Biological Blueprint*, *supra* note 4, at 2161; *DNA Fingerprint Launch*, 137 New L.J. 653 (1987).
18. *See Biological Blueprint*, *supra* note 4, at 2161.

sequence varies in size at each location.[19] Because every cell in a human body carries a DNA molecule which is unique to that body, each cell in the body carries the equivalent of a DNA fingerprint.[20] The DNA fingerprint sequences are detected in a long technical process; when presented they resemble bar codes used on packages in grocery stores.[21] "This band pattern is unique—not matched in the world—and unlikely to be matched to the extent of less than one chance in a million million."[22]

The complicated process[23] of creating DNA fingerprints takes about five days.[24] Once the fingerprints have been created, those taken from a known source can be compared with those taken from DNA molecules found at a crime scene. If the sample obtained from the crime scene came from the person who donated the sample whose source is known, the bar codes will

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19. *Id.*
20. *Id.*
21. *See supra* text accompanying note 4.
22. *See Biological Blueprint, supra* note 4, at 2161.
23. The process is basically conducted in the following manner:

> Firstly the blood is received in special sample packages and the DNA molecules are extracted from the white blood cells in the blood. The string-like DNA molecules are then cut by chemical scissors called a "restriction enzyme" which does not cut the DNA molecule where the fingerprint sequences are positioned. In this way the unique size and number of copies of the fingerprint sequences are preserved whilst the rest of our DNA is reduced to small fragments. The DNA fragments, which are negatively charged, are placed in a well at one end of a gel sheet and placed in an electric field so that they move towards the positive end of the gel sheet. The DNA fragments are assorted by size in the gel sheet with the smaller fragments moving faster through the gel.
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> The pattern of DNA fragments is then transferred to the surface of a nylon membrane by a technique known as Southern Blotting. During this transfer process the DNA fragments are kept in the same disposition by size achieved by the gel treatment. The DNA pattern, now bound onto the nylon membrane, is incubated in the presence of purified radioactive copies of the DNA fingerprinting sequence. These copies of "probes" bind specifically to the identical sequences in the DNA pattern on the membrane. Unbound probe sequence is washed off the membrane and the membrane is dried.
>
> It is then placed in a light proof cassette with a sheet of x-ray sensitive film. The radioactive probes, bound to the membrane at the positions of the matching fingerprinting sequences in the DNA pattern, expose the adjacent film to where they are bound.
>
> After developing the film, the exposed areas of the film appear as bands along the track of the DNA pattern. These bands are the DNA fingerprint. Normally a result will be reported within three weeks.

DNA Fingerprint Launch, supra note 17, at 653.

The estimated three-week period from submission of a sample to the laboratory to reception of the report of the results has already been increased to six to eight weeks. *See* Gold, *supra* note 1, at 1104. The greater delay is attributable to a backlog of requests. *Id.* As of November, 1987, Cellmark Diagnostics, the English company which holds a patent on the DNA test in England, had registered 1550 requests for analysis. *Id.*

24. *See DNA Fingerprint Launch, supra* note 17, at 653.

match perfectly; if the sample came from a different person, the bar codes will not match at all.[25] Scientists have successfully performed DNA fingerprinting analysis on "samples as small as one or two drops of blood, a few hair roots, or a trace of semen."[26]

The important difference between traditional blood tests and the DNA fingerprinting process is that the latter may result in positive identification of a suspect while the former can only positively exclude suspects from suspicion.[27] In other blood tests, blood stains found at a crime scene can only be identified as belonging to a blood type shared by a large portion of the population.[28] "One of the best things with DNA analysis, is that there are no false positives. If it's not the guy, it just isn't. The DNA just won't match at all."[29]

The DNA fingerprinting technique apparently has another advantage over conventional blood tests in that it can produce reliable results from samples which are several years old. Conventional blood tests cannot produce reliable results from samples older than a month.[30] Proponents of DNA fingerprinting, however, claim that it can produce reliable results from a four-year-old blood stain.[31] Furthermore, DNA fingerprinting can produce reliable results from semen samples up to two years old.[32] Recently, officials connected with the Gary Dotson rape trial subjected a ten-year-old semen sample to DNA fingerprint analysis to determine Dotson's guilt.[33] The officials were worried about the reliability of the test results, however, stating that the sample has not been stored in good conditions for all of the past ten years; Dr. Jeffreys, inventor of the DNA fingerprinting technique, has stated that the oldest sample he has previously been able to test was five years old, but added that "DNA is relatively hardy."[34] Unfortunately for Dotson, how-

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25. Haller, *Can DNA Save Dotson?*, 11 CHI. LAW. 1, 20 (Feb. 1988).

26. Hilt, *supra* note 2, at A23. DNA fingerprinting can also be performed on skin tissue and possibly even on cells in saliva. *See* Johnson, *DNA 'Fingerprinting' Becoming a Factor in Court*, The N.Y. Times, Feb. 7, 1988, at 1 (DNA fingerprints can be obtained from blood, semen, hair, saliva, and skin); Meisol, *DNA Test Gains Stature in Courtroom*, The St. Petersburg Times, Dec. 27, 1987, at 6B.

27. *See supra* text accompanying notes 5-7.

28. Hilt, *supra* note 2, at A23.

29. Hilt, *supra* note 2, at A23, quoting John K. Winkler, president of Lifecodes Corporation.

30. Begley, *supra* note 2, at 81.

31. Gill & Werrett, *Exclusion of a Man Charged with Murder by DNA Fingerprinting*, 35 FORENSIC SCI. INT'L 145, 145 (1987) ("DNA fingerprints can be obtained from dried blood samples up to four years old"); Meisol, *supra* note 26, at 6B (opinion of Alan Juste, one of Lifecode's scientists).

32. *See supra* note 31.

33. *See* Wilkerson, *Test May End 10-Year Rape Dispute*, The N.Y. Times, Feb. 7, 1988, at 46. The semen sample would come from a seminal stain on the victim's underwear and several pubic hairs.

34. *Id.* An Illinois forensic laboratory has retained the sample in frozen storage for the last three years. Previously, the evidence had been stored at room temperature in a Cook

ever, DNA is not hardy enough. Dr. Jeffreys recently announced that the DNA sample in his case had degraded to the extent that successful test results could not be obtained.[35]

One difficulty with the DNA fingerprinting techniques utilized by both Cellmark and Lifecodes is that they depend on high molecular weight DNA—molecules which have not become degraded or lost their mass.[36] Although DNA is rather hardy, moisture, bacteria, and heat all cause DNA to lose its mass.[37] This difficulty is significant considering the less-than-ideal conditions at crime scenes. Lifecodes has only been able to produce a success rate of approximately fifty percent in the rape cases authorities have submitted; the other samples were too degraded to produce any result.[38] As DNA fingerprinting becomes more widely used, though, police and forensic scientists will undoubtedly take steps designed to preserve crime scene evidence for later DNA testing.[39]

The DNA fingerprinting process is now commercially available in England and the United States. Cellmark Diagnostics of Oxfordshire, England, controls the market for DNA testing in Great Britain,[40] while Lifecodes Corporation dominates the market in the United States.[41] The fingerprinting process is expensive. Cellmark charges approximately $300 to perform DNA fingerprinting analysis[42] and Lifecodes charges between $500 and $800 in the United States[43] for a similar DNA fingerprint analysis.[44] The high cost raises serious questions about whether all criminal defendants will be able to

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County facility.

35. Moss, *DNA—The New Fingerprints*, 74 A.B.A.J. 66, 68 (1988).

36. *See* Haller, *supra* note 25, at 20.

37. *Id.*

38. *Id.* at 21. However, Jeffrey Ashton, Florida State Prosecutor for Orange County, has had an even lower success rate—one result out of approximately six submissions. Interview with Jeffrey Ashton, Florida State Prosecutor for Orange County, in Orlando, Florida (March 23, 1988).

39. *See* Haller, *supra* note 25, at 21.

40. *See* Gold, *supra* note 1, at 1104. Cellmark recently opened a branch laboratory in Germantown, Maryland.

41. *See* Meisol, *supra* note 26, at 6B. Lifecodes is located in Elmsford, New York. A third company, Forensic Science Association of Emeryville, California, uses a different method of DNA comparison called the polymerase chain reaction process. *See* Haller, *supra* note 25, at 21. Although this process can work with smaller-mass DNA and can achieve results from degraded DNA, it cannot produce a positive identification of a suspect; it can only eliminate a person from suspicion. To this extent the polymerase chain reaction process resembles blood testing techniques.

42. TIME, *supra* note 4, at 66.

43. Meisol, *supra* note 26, at 6B.

44. It is hard to do more than generalize about the costs, however, because the two companies price their services in different manners. Cellmark charges by the sample, while Lifecodes varies its asking price depending on the type of sample involved. *See* Haller, *supra* note 25, at 21.

afford the test.[45]

The Lifecodes Corporation uses a simpler and faster[46] DNA fingerprinting test than that used by Cellmark in England.[47] As a result, Lifecodes' methods are capable of distinguishing samples of any two unrelated people with a probable accuracy of 200,000 to one,[48] while the Cellmark method, which uses the more complex analysis developed by Dr. Jeffreys, is allegedly so accurate that the odds of any two unrelated people sharing the same DNA fingerprint are billions to one.[49] This difference in test reliability could take on real significance when courts consider the admissibility of DNA fingerprint evidence in criminal trials.[50]

A final difference between the two methods lies in the ease of interpreting the laboratory results. The Lifecodes test results are evidently easier for the jury to comprehend than those from the Cellmark test.[51] This creates a situation in which attorneys must wrestle with the pros and cons the two different tests offer.[52]

Proponents of DNA fingerprinting declare that the technique could be used to resolve a number of the 50,000 paternity suits, 80,000 rapes, and 20,000 homicides brought each year in the United States.[53] The English government has used DNA fingerprinting to determine paternity in cases in

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45. Few cities or states will be able to afford the $100,000 cost of a DNA laboratory and the highly trained personnel needed to operate it. Consequently both prosecutors and defense attorneys will be forced to rely on commercial laboratories. *See* Johnson, *supra* note 26, at 13. Even more important, however, are the effects which selective use of the DNA fingerprinting analysis might create in jurors' minds. The fear exists that "sophisticated jurors will be less inclined to convict suspects with traditional evidence. 'They'll say, "Okay, you've got the fingerprints, and you've got the eyewitness, but where's the DNA?" ' " Meisol, *supra* note 26, at 6B (quoting Florida State Prosecutor Jeffrey L. Ashton).

46. Meisol, *supra* note 26, at 6B. Lifecodes can produce results from a DNA test in thirty days while the Cellmark method takes from six to eight weeks.

47. *See* Johnson, *supra* note 26, at 13. "Although some DNA testing methods are considered accurate to the point of identifying a particular individual to the exclusion of all other living creatures, [James J. Kearny, forensic scientist at the Federal Bureau of Investigation Laboratory] said other systems offer only rough measure—for example, that one in 7,000 people would have similar genetic characteristics." *See also* Meisol, *supra* note 26, at 6B (Cellmark's method takes longer, is more complicated); Begley, *supra* note 2, at 81.

48. *See* Johnson, *supra* note 26, at 13. The article's author claims that even these odds are better than those offered by current forensic tests. Lifecodes Corporation says the probability is 99.9% that, if the DNA fingerprints match, they will be from the same individual. *See* Lifecodes Corp., *supra* note 1, at 1.

49. *See* Johnson, *supra* note 26, at 13.

50. *See infra* text accompanying notes 68-121.

51. Interview with Jeffrey Ashton, Florida State Prosecutor for Orange County, in Orlando, Florida (March 23, 1988).

52. *Id.* Mr. Ashton believes that, because the tests results are not compatible, one method will eventually take over the market, by necessity excluding the other.

53. Hilt, *supra* note 2, at A23. *See also* F.B.I., ANNUAL STATISTICS ON VIOLENT CRIMES (1985) (87,340 reported rapes, 18,976 reported homicides, 497,874 reported robberies, 723,246 reported aggravated assaults).

which the father is unknown or in which people have sought to enter the country and must prove themselves related to another in England.[54] Attorneys in the United States have also used the DNA fingerprinting test in paternity cases.[55]

Lawyers have recently begun to use DNA fingerprinting in criminal trials in England and the United States.[56] Leicestershire police have used DNA fingerprinting to eliminate one prime suspect in a double murder and rape inquiry.[57] Further, a rape suspect who had previously denied guilt, pleaded

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54. *See Family Law Update*, 137 NEW L.J. 469; Meisol, *supra* note 26, at 6B. Currently in England the DNA fingerprinting analysis may only be ordered in wardship proceedings since the powers which other courts enjoy under the Family Law Reform Act of 1969 are limited to conventional blood testing. 137 NEW L.J. at 469. But the Family Law Reform Act of 1987 allows any civil court in which parentage is in question to order a person to submit to DNA fingerprint analysis. Bainham, *supra* note 2, at 613. Parties are free, of course, to take the test voluntarily if they desire. Gold, *supra* note 1, at 1104. The test had been used to admit about forty new immigrants to England as of December, 1987. Meisol, *supra* note 26, at 6B.

55. Lifecodes has examined 5,000 people in paternity suits since it began the service in 1982. Meisol, *supra* note 26, at 6B.

56. It should be noted that the technique is so new that no reported cases, either in the United States or England, have dealt specifically with DNA fingerprinting. Two English cases, *Ex parte Anwar Miah*, Queens Bench Division (1987) (available on LEXIS), and *Ex parte Taslim Bi*, Queens Bench Division (Crown Office List) (1987) (available on LEXIS) have mentioned DNA fingerprinting. Both cases discuss DNA fingerprinting in connection with motions to review new evidence where trial courts had determined that the defendants had failed to demonstrate that they were related to British subjects and consequently had to leave the country. Both defendants sought to introduce new DNA fingerprinting evidence of their consanguinity on appeal. Without passing judgment on the validity of the DNA fingerprinting test, the courts in both instances refused to review the new evidence on appeal. Both cases were affirmed on other grounds.

To date DNA fingerprinting is only mentioned tangentially in one reported case in the United States. The defendant in Colby v. State, 73 Md. App. 233, 533 A.2d 944 (1987), had been arrested on several charges, including rape. The prosecution attempted to use a blood testing technique called Chromosome Variant Analysis (CVA). The court, however, held that CVA was not admissible because it had not been generally accepted as reliable by the relevant scientific community. *Id.* at ____, 533 A.2d at 950. *See also infra* text accompanying notes 68-121 (discussion of requirements for introduction of novel scientific evidence). In a footnote the court noted that DNA fingerprinting exists, but that an article in NEWSWEEK which discussed DNA fingerprinting (Begley, *Leaving Holmes in the Dust*, NEWSWEEK, Oct. 26, 1987, at 81) did not support the reliability of the CVA technique. *Id.* at 950 n.4.

While references to other cases are made throughout this Article, none are reported, nor have any risen above the trial level.

57. *See* Gold, *supra* note 1, at 1104; Hilt, *supra* note 2, at A23. In that case a fifteen-year-old girl was raped and murdered while walking near her home in Enderby, England. TIME, *supra* note 4, at 66. The police arrested a seventeen-year-old boy in connection with the crime but released him when his DNA fingerprint did not match that of semen recovered from the victim. *Id.* Thereafter, police requested that 4,000 local men voluntarily submit blood samples upon which DNA fingerprint analysis would be performed. NEWSWEEK, *supra* note 41, at 81. None of the samples matched, but police arrested a twenty-seven-year-old man, Colin Pitchfork, when he tried to send a friend to take his place at a blood test. *Id.* As of this writing the police have not yet taken Pitchfork's DNA fingerprint. *Id.* For a scientific discussion of the

guilty when shown that the DNA fingerprint of his blood matched the semen stains on the victim's clothing.[58] DNA fingerprinting constituted the primary evidence in a rape conviction in Bristol, England.[59] Moreover, the DNA fingerprinting process will come under increasing scrutiny in a series of rape, incest, and unlawful sexual intercourse cases due to be tried in the Old Bailey.[60]

Prosecutors and defense lawyers also have used DNA fingerprinting to a limited degree in the United States. Judges have admitted DNA fingerprints into evidence in criminal trials in Oklahoma,[61] Arkansas,[62] Florida, New York, and Pennsylvania.[63] Prosecutors presented a defendant with the results of a DNA fingerprinting test in a rape prosecution in Tacoma, Washington, and the defendant pleaded guilty.[64] DNA fingerprinting, however, has been the key evidence in only one successful conviction. A jury in Orange County, Florida, has convicted a man of rape in a trial in which DNA fingerprinting was used to implicate the suspect.[65] Evidently, juries attribute great weight to the probative value of the DNA fingerprinting evidence.[66]

The increasing use of DNA fingerprinting in criminal cases raises both evidentiary and constitutional concerns. First, the question arises whether this new technique is "sufficiently established to have gained general acceptance in the particular field in which it belongs" such that it may be introduced into evidence at a criminal trial.[67] Second, DNA fingerprinting also raises a concern whether admission of such evidence will violate constitutional protections.

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process used to produce the DNA fingerprinting evidence in this case, *see generally* Gill & Werrett, *supra* note 31.

58. *See* Gold, *supra* note 1, at 1104. In fact, many suspects have begun to plead guilty when faced with positive DNA fingerprinting test results. *See* Meisol, *supra* note 26, at 6B.

59. *See* Gold, *supra* note 1, at 1104.

60. *See id.*

61. The Oklahoma case was based on a bloodstain found on a vacuum cleaner which allowed police to establish that a missing man was at the scene of the crime. *See* The Washington Post, *supra* note 2, at A23.

62. *See* Johnson, *supra* note 26, at 1 (handful of courtrooms, including one in Arkansas, allowed scientific testimony about DNA tests).

63. Meisol, *supra* note 26, at 6B.

64. *See* Haller, *supra* note 25, at 22.

65. Jimmy Lee Andrews, a twenty-three-year-old Florida resident, has the dubious honor of being the first man in the United States to be convicted of a crime through the use of DNA fingerprints. *See* Johnson, *supra* note 26, at 46.

66. *See* Haller, *supra* note 25, at 21 (Richard Sitzman, Oklahoma attorney, stated that "the jury accepted the DNA testing as absolutely indisputable") (interview with Jeffrey Ashton, Florida State Prosecutor for Orange County, in Orlando, Florida (March 23, 1988)).

67. "[S]ufficiently established to have gained general acceptance in the particular field in which it belongs" was the test enunciated in the landmark case of *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923). *Frye* established the general test for admissibility of scientific evidence in criminal trials. For discussion of the admissibility of DNA fingerprints, *see infra* text accompanying notes 68-121.

III. Admissibility of DNA Fingerprints into Evidence in Criminal Cases

As a novel type of scientific evidence, DNA fingerprinting must be shown to have a certain degree of reliability before it will be admitted into evidence in criminal cases. The sixty-five-year-old test enunciated in *Frye v. United States*[68] still substantially controls the introduction of novel scientific evidence in criminal cases.[69] In *Frye* the prosecution attempted to introduce the results of a crude precursor of the polygraph test into evidence against a criminal defendant.[70] The court affirmed the trial court's suppression of the evidence, stating that, "while courts will go a long way in admitting expert testimony deduced from a well-recognized 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."[71] Some courts have deemed "general acceptance" to be essentially synonymous with "reliability."[72]

It has been said that jurors attach an "aura of special reliability and trustworthiness" to expert scientific witnesses.[73] Some commentators fear

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68. Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

69. *See* Starrs, Frye v. United States *Restructured and Revitalized: A Proposal to Amend Federal Evidence Rule 702*, 115 F.R.D. 92 (1987). The author supported the *Frye* test, stating: "The general acceptance of the *Frye* standard for the admissibility of scientific evidence has been besieged and bombarded ever since its pronouncement in 1923, but it has withstood every scholarly, judicial, and legislative assault. This, in itself, is stirring testimony both to its durability and to its suitability in the legal system." *Id.* at 92. *See also infra* text accompanying notes 115-20 for discussion of contemporary attack on the *Frye* test. It is interesting to note that though the *Frye* opinion has had such a significant impact on the admissibility of scientific evidence, yet the entire opinion occupies but two pages in the reporter.

70. Frye v. United States, 293 F. at 1013.

71. *Id.* at 1014.

72. *See* United States v. Franks, 511 F.2d 25 (6th Cir.), *cert. denied*, 422 U.S. 1042 (1972).

73. United States v. Kozminski, 821 F.2d 1186, 1199 (6th Cir. 1987) (Krupansky, J., concurring). *See also* United States v. Brown, 557 F.2d 541, 556 (6th Cir. 1977). In *Brown*, the court justified the *Frye* test by stating:

> A courtroom is not a research laboratory. The fate of a defendant in a criminal prosecution should not hang on his ability to successfully rebut scientific evidence which bears an "aura of special reliability and trustworthiness," although in reality the witness is testifying on the basis of an unproved hypothesis in an isolated experiment which has yet to gain general acceptance in its field.

Id. at 556. *See also* United States v. Baller, 519 F.2d 463, 466 (4th Cir.), *cert. denied*, 423 U.S. 1019 (1975). In *Baller*, the court stated:

> There are good reasons why not every ostensibly scientific technique should be recognized as the basis for expert testimony. Because of its apparent objectivity, an opinion that claims a scientific basis is apt to carry undue weight with the trier of fact. In addition, it is difficult to rebut such an opinion except by other experts or by cross-examination based on a thorough acquaintance with the underlying principles. In order to prevent deception or mistake and to allow the possibility of effective response, there must be a demonstrable, objective procedure for reaching the opinion and qualified persons who can either duplicate the result or criticize the means by which it

that juries attribute a "mystic infallibility" to scientific testimony.[74] Some studies have indicated, however, that jurors have a greater capacity to understand and weigh scientific evidence than some commentators believed.[75] In any event, the *Frye* test serves to guard against the potentially prejudicial effect which might result from the introduction of scientific evidence which is not, in fact, as reliable as it appears.

It is not entirely clear which party has the burden of proof in establishing the general acceptance or nonacceptance of a novel scientific method. For example, Federal Rule of Evidence 403 admits relevant evidence unless the opponent can demonstrate that its probative value is substantially outweighed by its prejudicial effect.[76] Federal Rule of Evidence 702, however, is a more specific provision which appears to place the burden on the proponent of scientific evidence to establish its admissibility.[77] In practice it appears that courts commonly place the burden on the proponent of novel scientific evidence to show that it is generally accepted in the relevant field.[78]

Whether the proponent of a novel scientific test has met the burden of demonstrating its general acceptance usually falls within the trial judge's sound discretion.[79] The scope of this discretion is broad and the trial judge's

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was reached, drawing their own conclusions from the underlying facts.

Id. at 466.

74. *See* United States v. Addison, 498 F.2d 741, 744 (D.C. Cir. 1974).

75. *See* Lacy, *Scientific Evidence*, JURIMETRICS J. 254, 259 (1983-84); Imwinkelried, *The Standard for Admitting Scientific Evidence: A Critique from the Perspective of Juror Psychology*, 28 VILL. L. REV. 554, 570-71 (1982-83) (empirical data do not support denunciation of jurors' handling of scientific evidence).

76. FED. R. EVID. 403 reads: "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." *Id. See* Berger, *A Relevancy Approach to Novel Scientific Evidence*, 115 F.R.D. 89, 91 (1987) (discussing proposal to reverse burden under 403 to proponent of scientific evidence).

77. FED. R. EVID. 702 reads: "If scientific, technical, or other specialized knowledge will assist the trier-of-fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." *Id. See* United States v. Green, 548 F.2d 1261, 1268 (6th Cir. 1977). In *Green* the court applied Federal Rule of Evidence 702 to the admissibility of novel scientific evidence, holding that 702 requires the proponent of the evidence to show four things: (1) a qualified expert; (2) testifying on a proper subject; (3) in conformity to a generally accepted explanatory theory; (4) the probative value of which outweighs any prejudicial effect. *Id.* at 1268. The court held that the third factor requires the proponent to make a *Frye*-type showing. *Id. See also* United States v. Kozminski, 821 F.2d 1186, 1194 (6th Cir. 1987) (same); United States v. Smith, 736 F.2d 1103, 1105 (6th Cir.), *cert. denied*, 469 U.S. 868 (1984) (same).

78. *See* Cobey v. State, 73 Mo. App. 233, ____, 533 A.2d 944, 946 (1987) (applying *Frye* and state analogs, proponent of new scientific test bears burden of producing evidence to establish technique's general acceptance).

79. *See* United States v. Williams, 443 F. Supp. 269 (S.D.N.Y. 1977) (judge's responsibil-

decision should be sustained "unless it is manifestly erroneous."[80] If the trial judge deems the scientific evidence admissible, the jury may then review the evidence and accord it whatever weight it considers merited.[81]

In determining whether a particular scientific test has been generally accepted in the relevant scientific community, courts look at a number of factors. For example, courts will consider whether other scientists have written or published articles supporting the test,[82] and whether any trade organization has recognized the test,[83] as factors probative of the degree of acceptance of the test. Courts also consider whether other courts have admitted the novel scientific evidence.[84] Further, courts are often accused of conducting "scientific nose-counting"[85] to determine acceptability.[86] Courts will almost always look to the statistical reliability of the test, where possible, in determining reliability.[87] Finally, there are other factors, such as the care

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ity to assess acceptability of scientific evidence); United States v. Stifel, 433 F.2d 431, 438 (6th Cir. 1970), *cert. denied*, 401 U.S. 994 (1971) (same).

80. United States v. Brown, 557 F.2d 541, 556 (6th Cir. 1977); United States v. Green, 548 F.2d 1261, 1268 (6th Cir. 1977).

81. *See* Feguer v. United States, 302 F.2d 214, 242 (8th Cir.), *cert. denied*, 371 U.S. 872 (1962) (jury entitled to review evidence and accord it such weight as jury feels is warranted).

82. *See* United States v. Kozminski, 821 F.2d 1186, 1202 (6th Cir. 1987) (Krupansky, J., concurring) (no literature supporting expert witness' theory); Starrs, *supra* note 69, at 99 (relevant scientific literature could illuminate validity of new scientific evidence).

83. *See* United States v. Kozminski, 821 F.2d at 1202 (Krupansky, J., concurring) (Diagnostic and Statistic Manual of Mental Disorders, recognized official authority of American Psychiatric Association, had no entry for type of disorder expert witness claimed victims suffered); United States v. Distler, 671 F.2d 954, 962 (6th Cir. 1981) (method adopted by American Society for Testing and Materials considered probative).

84. *See* United States v. Kozminski, 821 F.2d 1186, 1202 (6th Cir. 1987) (Krupansky, J., concurring) (first court in which party attempted to introduce scientific method and court suppressed evidence); United States v. Distler, 671 F.2d at 962 ("at least two other courts have found the same test reliable"; court admits evidence); United States v. Williams, 443 F. Supp. at 271 (scientific evidence admitted when prosecution presented evidence that spectrographic voice identification had been admitted by at least two other courts). Reliance on other courts' decisions is a questionable practice. "To rely upon other courts on the question is either to hazard error, a not unlikely eventuality knowing the appellate courts' penchant for scientific evidence or error, or to receive scientific opinions second-hand and after distillation in an appellate court's opinion." Starrs, *supra* note 69, at 99. *See also, e.g.*, State v. Sharbono, 175 Mont. 373, ___, 563 P.2d 61, 67 (1977) (court refers to gas chromatograph as gaschromebiograph and refers to nonexistent gaschromebiography journal); State v. Williams, 4 Ohio St. 3d 53, ___, 446 N.E.2d 444, 446 n.3 (1983) (refers to old edition of text, newer edition having more negative view of scientific evidence used, and ignores National Academy of Science study which found voiceprints not yet reliable enough to be introduced into evidence).

85. State v. Williams, 4 Ohio St. 3d 53, ___, 446 N.E.2d 444, 448 (1983).

86. *See* Starrs, *supra* note 69, at 97 (arguing that, although common criticism, accusation of scientific nose-counting without just cause). Yet later in the same article, the author suggests that forensic scientists may help determine the validity of a novel scientific test. *Id.* at 99.

87. *See, e.g.*, United States v. Distler, 671 F.2d at 962 (test reliable in excess of 90% of the time for one chemical; when one chemical is tested against another, test becomes 99% accurate); United States v. Williams, 443 F. Supp. at 272 (recent errors of up to 6.3% exper-

with which a test is performed and the experience of the tester,[88] which are case-specific inquiries for any scientific test, regardless of whether the test is novel or not.

A major concern now lies in defining the relevant scientific community for the purposes of the *Frye* test. This is because those who have a personal stake in DNA testing claim that they constitute the relevant scientific community, and hold that DNA fingerprints are acceptable, while those with nothing to be gained from the success of DNA fingerprinting are of mixed opinions.[89] For example, Cecil Hider, director of the California Bureau of Forensic Sciences, has argued that "[t]he forensic community in this country is not using DNA, and the relevant community to me means the forensic community."[90] Others believe that molecular biologists and geneticists, not forensic scientists, constitute the relevant scientific community.[91]

A. *Factors Favoring the Admissibility of DNA Fingerprints*

Proponents of the DNA fingerprinting test can point to a number of factors relevant under the *Frye* test which suggest that the technique should be admissible in evidence. First of all, at least two companies have been able to develop the method commercially, employing a number of scientists capable of either duplicating the method or subjecting it to criticism.[92] Although no appellate court in either the United States or England has issued a written decision on the merits of DNA fingerprinting, a number of trial courts in both countries have been admitting testimony based on the technique for some time.[93] A number of articles have been published demonstrating the reliability of DNA fingerprinting.[94] DNA fingerprinting also has a supporter

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ienced with test, but when diminished by 2%, accurate enough for admission); Starrs, *supra* note 69, at 99 (rate of error an indicator of validity of tests).

88. *See* United States v. Williams, 583 F.2d 1194 (2d Cir. 1978); Starrs, *supra* note 69, at 99 (factors considered include standards controlling operation of test and care with which tests are performed).

89. *See* Haller, *supra* note 25, at 21.

90. *Id.*

91. Interview with Jeffrey Ashton, Florida State Prosecutor for Orange County, in Orlando, Florida (Mar. 23, 1988).

92. *See* United States v. Addison, 498 F.2d 741, 744 (D.C. Cir. 1974) (there must be "minimum reserve of exist[ing] experts who can critically examine the validity of a scientific determination in a particular case"). This disposes of one problem posed by novel scientific evidence—the fact that the defendant must have adequate means of cross-examining the state's witnesses. *See supra* text accompanying note 71.

93. *See supra* text accompanying notes 54-66.

94. *See generally, e.g.*, Gill & Werrett, *supra* note 31; Kanter, Baird, Shaler & Balazs, *Analysis of Restriction Fragment Length Polymorphisms in Deoxyribonucleic Acid (DNA) Recovered from Dried Blood Stains*, 31 J. FORENSIC SCI. 403 (1986); Giusti, Baird, Pasquale, Balazs & Glassberg, *Application of Deoxyribonucleic Acid (DNA) Polymorphisms to the Analysis of DNA Recovered from Sperm*, 31 J. FORENSIC SCI. 409 (1986); Gill, Jeffreys & Werrett, *Forensic Application of DNA "Fingerprints,"* 318 NATURE 577 (1985). The reader should note,

in Charles E. Housman, the eminent geneticist at the Massachusetts Institute of Technology.[95] Housman has testified in a Florida trial that DNA fingerprinting was the "test of choice in the scientific community," which no one disputed either with medical journals or in-court testimony.[96] Further, British authorities seem to be completely convinced of the test's validity and have accepted DNA fingerprinting in both criminal and civil cases.[97] Finally, a significant factor in favor of DNA fingerprinting's reliability is its almost insignificant statistical probability of error.[98]

It is instructive to look at the factors one court found influential in a recent case in which the prosecution in a rape trial attempted to introduce a form of DNA testing, but not DNA fingerprinting. In *Cobey v. State*[99] the prosecution attempted to introduce the results of a Chromosome Variant Analysis (CVA) test, in which the DNA of the suspect was compared to that of the rape victim's aborted fetus.[100] The court first noted that the CVA test could only prove the possibility that the suspect *might* be the father—not that the suspect *was* the father.[101] Applying the *Frye* test the court noted that there were no articles other than her own, which the prosecution's expert could point to in support of her conclusions concerning the reliability of CVA.[102] In fact, while in her own article she claimed a success rate of one hundred percent, the defense cited another article which claimed that the success rate of CVA was no more than seventy-two percent.[103] The court concluded that the *Frye* test mandated suppression of the results of the CVA test.[104]

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however, that the articles are written by those who may have a financial stake in the success of DNA fingerprinting—no independent population studies have yet been published. *See* Haller, *supra* note 25, at 20.

95. Meisol, *supra* note 26, at 6B.

96. *Id.* Moreover, James E. Starrs, a lawyer and forensic expert at George Washington University and an advisor to Cellmark Diagnostics, has also supported the use of DNA fingerprints. Hilt, *supra* note 2, at A23. This is quite significant because this is the same James Starrs who has been cited for the defense of the *Frye* test in this Article. *See supra* note 69. That a proponent of the *Frye* test supports the admissibility of DNA fingerprinting, while expressing criticism of the admissibility of other scientific evidence such as voiceprints, *supra* note 69, at 99-100, supports the conclusion that DNA fingerprinting can pass the *Frye* test.

97. Begley, *supra* note 2, at 81.

98. *See supra* text accompanying notes 47-49.

99. Cobey v. State, 73 Md. App. 233, 533 A.2d 944 (1987).

100. *Id.* at ____, 533 A.2d at 946.

101. *Id.* Compare this to the possibility of making a positive identification through DNA fingerprinting. *See supra* text accompanying notes 27-29.

102. *Id.* at ____, 533 A.2d at 949. Compare this to the other literature supporting the applicability of DNA fingerprinting. *See supra* text accompanying note 94.

103. *Id.* at ____, 533 A.2d at 949. Compare this to unchallenged mathematical probability which is available under DNA fingerprinting. *See supra* text accompanying notes 47-49.

104. *Id.* at ____, 533 A.2d at 950.

B. *Factors Against the Admissibility of DNA Fingerprints*

Not all the factors, however, favor the admissibility of DNA fingerprinting. Most significantly, the Federal Bureau of Investigation (FBI) Laboratory in Quantico, Virginia, held a year ago that the DNA fingerprinting test, "while scientifically sound, needed to be refined before it could be widely used."[105] Recently the FBI has stated that it has conferred with Dr. Jeffreys and the private companies, but it will not establish standards for the test's use for a year or two.[106] James J. Kearney, chief of the FBI's forensic science research and training laboratory, stated:

> When we ask the commercial laboratories about these things [the effects of degradation and contamination on the validity of the DNA fingerprinting test results], they say they've done the work but they haven't published it yet. Until they do, we can't check their work, look at their methods, or try to duplicate their results. If they have studies dealing with dried stain materials, they should be in the literature so we can see if their claims are justified.[107]

Finally, one court has mentioned in a footnote that an author of a *Newsweek* article[108] has predicted that it is "too soon" for DNA fingerprints to be admitted into evidence in United States courts.[109] The author of that article, however, merely cited a rough approximation of the *Frye* test and then stated her opinion without justification or citation to any authority.[110]

It is instructive to review the case of *People v. Young*.[111] In *Young* the Michigan Supreme Court held that the prosecution failed to meet its burden of establishing that an electrophoresis technique used to identify certain proteins in dried blood was admissible under the *Frye* test.[112] The court seriously questioned the reliability of the test because no control tests had been presented which demonstrated the reliability of the tests when the blood sample was contaminated or degraded.[113] Cecil Hider, director of the California Bureau of Forensic Sciences, believes that the court's concerns in *Young* are equally applicable to DNA fingerprinting tests at this point in their development.[114]

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105. Meisol, *supra* note 26, at 6B. At the time the FBI Laboratory's own version of the DNA fingerprinting test had one chance in 3,500 of failure. *Id. See* Johnson, *supra* note 26, at 1 (James J. Kearny of FBI Laboratories in Quantico, Virginia, quoted as saying, "whether these are technologies that can be used in all crime laboratories remains to be seen.").

106. Meisol, *supra* note 26, at 6B.

107. Haller, *supra* note 25, at 22.

108. Begley, *supra* note 2, at 81.

109. *See* Cobey v. State, 73 Md. App. 233, ____, 533 A.2d 944, 950 n.1 (1987).

110. *See* Begley, *supra* note 2, at 81.

111. People v. Young, 425 Mich. 470, 391 N.W.2d 270 (1986).

112. *Id.* at 475-76, 391 N.W.2d at 272.

113. *Id.*

114. *See* Haller, *supra* note 25, at 22.

It is important to note that the *Frye* test has come under increasing criticism lately. A number of commentators have criticized *Frye* for its numerous deficiencies.[115] The many criticisms of *Frye* include: the test is unclear and hard to apply,[116] it is unduly conservative in its effect on the admissibility of novel scientific evidence,[117] and it contradicts the Federal Rules of Evidence,[118] the underlying theme of which is to let in all reliable evidence, whether or not adopted by the scientific community. Most critics of the *Frye* test propose to replace it with a simple rule of reliability or validity,[119] where the level of scrutiny a judge will apply will depend upon the type of evidence presented.[120] A simple relevancy test is generally seen as more receptive to novel scientific evidence than the *Frye* test.

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115. *See generally* Moenssens, *Admissibility of Scientific Evidence—An Alternative to the Frye Rule*, 25 WM. & MARY L. REV. 545 (1984); *Symposium on Science and Rules of Evidence*, 99 F.R.D. 188, 229-33 (1983) (all three working groups unanimously agreed on need to abandon *Frye*); Graham, *Relevancy and the Exclusion of Relevant Evidence: Admissibility of Evidence of a Scientific Principle or Technique—Application of the Frye Test*, 19 CRIM. L. BULL. 51 (1983); McCormick, *Scientific Evidence: Defining a New Approach to Admissibility*, 67 IOWA L. REV. 879 (1982); Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197 (1980).

116. *See* United States v. Downing, 753 F.2d 1224 (3rd Cir. 1985). The *Downing* court stated that the *Frye* test was not only too conservative but also too vague. *Id.* at 1236. Stated the court:

> [T]he vague terms included in the standard have allowed courts to manipulate the parameters of the relevant "scientific community" and the level of agreement needed for "general acceptance." Thus some courts, when they wish to admit evidence, are able to limit the impact of *Frye* by narrowing the relevant scientific community to those experts who customarily employ the technique at issue.

Id. at 1236. The court cited further problems with the *Frye* test:

> [T]he selectivity among courts in determining whether evidence derives from "novel" principles; the inadequacy of expert testimony on many scientific issues; an uncritical acceptance of prior *judicial*, rather than scientific, opinion as a basis for finding "general acceptance"; and the narrow scope of review by which some appellate courts review trial court rulings.

Id. at 1237 (emphasis original). *See also* Lederer, *Resolving the Frye Dilemma—A Reliability Approach*, 115 F.R.D. 84, 85 (1987) (*Frye* test unclear and unduly conservative).

117. *See* United States v. Downing, 753 F.2d 1224, 1236 (3rd Cir. 1985) (one problem with the *Frye* test is "its conservatism"); Lederer, *supra* note 116, at 85 (unduly conservative); Hollander, *Proposed Amendments to the Federal Rules on Admissibility of Scientific Evidence: A Defense Counsel's Perspective*, 115 F.R.D. 121, 121 (1987) (*Frye* test should be abandoned primarily because it is too conservative and inflexible). *But see* Starrs, *supra* note 69, at 94 (arguing *Frye* test has not unjustifiably excluded any novel scientific evidence).

118. *See* Lederer, *supra* note 116, at 84 ("unclear whether *Frye* survived adoption of the Federal Rules of Evidence and its various state analogs"); Hollander, *supra* note 117, at 122 (*Frye* "barrier to admissibility flies in the face of the purpose of the Federal Rules of Evidence"); 3 J. WEINSTEIN & M. BERGER, WEINSTEIN'S EVIDENCE §§ 702[03], 702[06] (1985).

119. *See generally Rules for Admissibility of Scientific Evidence*, 115 F.R.D. 79 (1987).

120. *See* United States v. Downing, 753 F.2d 1224 (3d Cir.), *on remand*, 609 F. Supp. 784 (E.D. Pa.), *aff'd mem.*, 780 F.2d 1017 (3d Cir. 1985) (level of scrutiny should vary depending on type of evidence). *See also* C. MCCORMICK, THE LAW OF EVIDENCE § 203 (2d ed. 1972) (same).

In light of the general dissatisfaction with the *Frye* test, courts generally will not apply the test in a strict fashion. This suggests that, at least in some courts, the relevant scientific community may play a less significant role in determining admissibility. Therefore, in those courts which have moved away from the *Frye* test, DNA fingerprinting stands a greater chance of admissibility.

Reviewing all the evidence thus far presented concerning DNA fingerprints, it appears that general admission of test results into evidence in criminal cases would be premature. More must be known about the reliability of the process with respect to degraded crime scene evidence. For this reason, many forensic scientists are currently unwilling to attempt admitting DNA fingerprinting test results into evidence for fear that rejections under the *Frye* test would hamper its future admissibility by creating unfavorable precedent.[121] The consensus discernible from commentators, however, suggests that DNA fingerprinting will eventually be proven reliable and will revolutionize criminal law when admitted into evidence on a regular basis.

IV. Constitutional Concerns

Many constitutional concerns will arise if DNA fingerprinting results are admitted into evidence in criminal trials on a regular basis. If the prosecution wishes to utilize the test, it must secure some sample of the suspects' DNA molecules in order to compare their DNA fingerprint to a DNA fingerprint obtained from DNA molecules found at the crime scene.[122] The pur-

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121. *See* Haller, *supra* note 25, at 22.

122. Of course, the situation could be reversed. Consider the situation in which the police arrest a murder suspect and find on the suspect blood which they believe to belong to the murder victim. In this situation police would seek to match the DNA fingerprints of the blood found on the suspect with that of the murder victim. Situations of this type have occurred many times.

For example, in Cupp v. Murphy, 412 U.S. 291 (1973), police had brought a suspect to the police station when the police spotted dried blood under the suspect's fingernails. *Id.* at 292. Police took scrapings of his fingernails against his will and without first obtaining a warrant. *Id.* Although the suspect was not, at that time, under arrest, the court upheld the warrantless search on the grounds that the police had probable cause and the evidence could easily be destroyed. *Id.* at 294-95. In *Cupp* the police subjected the blood samples to conventional blood testing. Today the same evidence might be subjected to DNA fingerprint testing. In fact, DNA fingerprints have already been used in just such a situation. The first court testimony involving DNA fingerprinting in New York occurred in a Rockland County case in which DNA fingerprints of blood stains found on a knife were matched against the DNA fingerprints of the victim. The defendant in that case, however, was ultimately acquitted.

The courts have developed a line of case law for dealing with this type of situation. It will not change with the event of the DNA fingerprinting analysis. The law *will* change, however, where the need exists to obtain a sample from the suspect's own body. The development of DNA fingerprinting will change the law in this area because it has created a new and substantial need to obtain samples. It is this latter concern, that of compelling suspects to give a sample of their own body, that is the subject of the second part of this Article.

pose of obtaining this evidence from suspects is to prove identity. If suspects refuse to provide samples because they do not wish to help in their own prosecution, then the question arises whether suspects can be compelled to give samples against their will.[123]

Several constitutional provisions protect suspects from being compelled to help the prosecution by assisting in producing self-incriminating identification evidence. First, the fourth amendment protects against unreasonable searches and seizures.[124] The question under the fourth amendment is whether the taking of a sample from a suspect for the purpose of DNA fingerprinting analysis is unreasonable and whether police need a search warrant to obtain a sample.[125] Second, the fifth amendment privilege against self-incrimination protects suspects from being compelled to bear witness against themselves.[126] Compelling suspects to provide samples to the prosecution to enable it to conduct DNA fingerprinting analysis is arguably equivalent to compelling suspects to be witnesses against themselves.[127] Third, the due process clauses of the fifth and fourteenth amendments protect citizens from being deprived of life, liberty, or property without due

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123. At a crime scene DNA fingerprints can be obtained from blood, semen, a few hair roots, skin tissue, and possibly even from the cells in the saliva left on a cigarette butt. *See supra* text accompanying note 26. Presumably, then, police could obtain a suspect's DNA fingerprint from like sources. A blood sample, however, would be the most accurate source. Taking a sample of a few hair roots might impose a lesser burden on an individual's rights, but it is also more susceptible to impeachment—hair is harder to preserve and others' hairs often are found on a person. A skin tissue sample would be a good source, but this would require a greater invasion of a suspect's privacy because a scraping of skin would be necessary. Obtaining a semen sample from a suspect would obviously be a major invasion of privacy rights.

Blood samples, on the other hand, are easy to obtain, with only a puncturing of the skin. Because the sample is drawn directly from inside the suspect's body, there is no chance that the source of the sample is actually another person. Blood samples can be easily kept in marked vials for storage.

Because police will probably prefer taking blood samples from suspects, this Article will assume that suspects will be asked to provide blood samples when police wish to perform DNA fingerprinting tests. The recent example in which English authorities requested 4,000 men to submit blood samples suggests that police will prefer to take blood samples. Begley, *supra* note 2, at 81. The analysis that follows does not suffer if this assumption is incorrect, because if a suspect does not voluntarily submit a sample of blood, semen, hair roots, or skin tissue, some compulsion would still be necessary to obtain the sample. Thus the same issues are raised regardless of the type of sample the police seek from a suspect.

124. The fourth amendment reads:

> The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

U.S. CONST. amend. IV.

125. *See infra* text accompanying notes 179-86.

126. The fifth amendment reads, in pertinent part: "No person shall be . . . compelled in any criminal case to be a witness against himself . . . ." U.S. CONST. amend. V.

127. *See infra* text accompanying notes 187-90.

process of law.[128] The question is whether anything remains of substantive due process which would bar the government from compelling suspects to surrender a blood sample against their will—a practice which may shock the community's conscience.[129]

A. *Precedent Concerning Compelled Identification Evidence*

The identity of criminals is often at issue in criminal cases, and courts have dealt with this issue in a number of cases. In the first United States Supreme Court case directly on this point, *Holt v. United States*,[130] a murderer's identity was in question. In an opinion by Justice Holmes, the Court upheld the trial court's order that the suspect put on a particular blouse in order to facilitate identification by a witness.[131] The defendant brought a fifth amendment challenge, claiming that requiring him to assist in his own incriminating identification against his will violated his privilege against self-incrimination.[132] The Court dismissed this challenge by drawing a distinction between "communications" and "body evidence."[133] The fifth amendment, according to Justice Holmes, protects only communications and not body evidence.[134]

Most courts have substantially followed the *Holt* decision, and have held that suspects can be compelled to cooperate in many ways in their own identification. For example, courts have held that suspects may be compelled to cooperate in fingerprint,[135] physical,[136] and x-ray[137] examinations,

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128. The fifth amendment reads, in pertinent part: "No person shall be . . . deprived of life, liberty, or property, without due process of law . . . ." U.S. CONST. amend. V.

The fourteenth amendment reads, in pertinent part: "No state shall make or enforce any law which shall . . . deprive any person of life, liberty, or property, without due process of law . . . ." U.S. CONST. amend. XIV.

129. *See infra* text accompanying notes 191-97.

130. Holt v. United States, 218 U.S. 245 (1910).

131. *Id.* at 252-53.

132. *Id.* at 252.

133. *Id.* at 252-53. Holmes noted that if the defendant's challenge were taken to its logical conclusion, it would forbid a jury or witness from viewing the suspect and comparing the suspect with a picture offered in proof. *Id.* at 253.

134. *Id.* at 253.

135. *See, e.g., In re* Maguire, 571 F.2d 675, 676 (1st Cir. 1978) (defendant compelled to appear in line-up and give fingerprints), *cert. denied*, 436 U.S. 911 (1978); State v. Woodard, 387 So. 2d 1066, 1070 (La. 1980) (defendant required to be fingerprinted in front of jury); Johnson v. Commonwealth, 208 Va. 481, 486, 158 S.E.2d 725, 728 (1968) (defendant compelled to give finger and palm prints). *But see* Davis v. Mississippi, 394 U.S. 721, 726-28 (1969) (fingerprints obtained during brief detention of persons seized in police dragnet, without probable cause as to particular defendant, inadmissible in evidence).

136. *See, e.g.*, Aaron v. State, 273 Ala. 337, 342, 139 So. 2d 309, 314 (1961) (defendant compelled to repeat words victim alleged attacker said); State v. Emerson, 266 Minn. 217, 220, 123 N.W.2d 382, 385 (1963) (admission of x-rays, photographs not violation of fifth amendment).

137. *See* State v. Emerson, 266 Minn. 217, 281, 123 N.W.2d 382, 386 (1963) (compelled

and in examinations by ultraviolet light.[138] Many courts have compelled suspects to put on or take off apparel or accessories.[139] Courts have upheld police compulsion of voice exemplars.[140] Finally, courts have held admissible compelled handwriting exemplars.[141]

B. Schmerber

The most notable case for the purposes of this Article is *Schmerber v. California*[142] because it dealt with the forced extraction of blood from a suspect. In *Schmerber* police suspected that a driver, who had been transported to a hospital after an accident, might be intoxicated.[143] The police arrested the driver at the hospital for driving while intoxicated, and requested that he give a blood sample.[144] The driver refused to consent to the police officers' request, on advice from counsel.[145] The police, however, directed the doctor to extract a blood sample from the driver.[146] The trial court admitted into evidence the results of the chemical analysis performed on the blood, which indicated that the driver was intoxicated.[147] On appeal to the United States Supreme Court, the driver challenged the admissibility of the blood test results on two constitutional grounds: the fourth amendment right to be free from unreasonable searches and seizures and the fifth amendment privilege against self-incrimination, both by way of the fourteenth amendment due process clause.[148]

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taking of x-rays not violation of fourth amendment).

138. *See* United States v. Richardson, 388 F.2d 842, 845 (6th Cir. 1968) (examination of hands with ultraviolet light not a search under fourth amendment).

139. *See, e.g.*, United States v. Satterfield, 572 F.2d 687, 690 (9th Cir.), *cert. denied*, 439 U.S. 840 (1978) (defendant compelled to wear mask); United States v. Murray, 523 F.2d 489, 492 (8th Cir. 1975) (defendant forced to wear wig); United States v. Turner, 472 F.2d 958, 959 (4th Cir. 1973) (defendant required to put on wig and sunglasses); United States v. Gaines, 450 F.2d 186, 195 (3d Cir. 1971), *cert. denied*, 405 U.S. 927 (1972) (defendant compelled to put on scarf); People v. Sanders, 58 A.D.2d 525, 395 N.Y.S.2d 190 (1977) (suspect required to remove glasses).

140. *See, e.g.*, United States v. Dionisio, 410 U.S. 1, 5-6, 14 (1973) (Court rejects fourth and fifth amendment challenges to admission of compelled voice exemplar); United States v. Wade, 388 U.S. 218, 222 (1967) (suspect compelled to repeat robber's words in front of witness).

141. *See, e.g.*, United States v. Mara, 410 U.S. 19, 22 (1973) (suspect held in contempt of court for refusing to provide handwriting exemplar); Gilbert v. California, 388 U.S. 263, 266 (1967) (compelled handwriting exemplar not violation of fifth amendment). *Cf.* United States v. Euge, 444 U.S. 707, *reh'g denied*, 446 U.S. 913 (1980) (statutory provision empowers Internal Revenue Service to subpoena handwriting exemplars).

142. Schmerber v. California, 384 U.S. 757 (1966).

143. *Id.* at 758.

144. *Id.*

145. *Id.* at 759.

146. *Id.* at 758.

147. *Id.* at 759.

148. *Id.* The driver also claimed a sixth amendment denial of the right to counsel. The Court rejected that claim, however, on the ground that the driver had no right under another

1. *Fourth Amendment Analysis Under* Schmerber

The Supreme Court rejected the driver's fourth amendment claim that extraction of blood from his body against his will was an unreasonable search and seizure.[149] The Court noted that the "overriding function of the Fourth Amendment is to protect personal privacy and dignity against unwarranted" government invasion.[150] Therefore, the compulsory administration of a blood test "plainly involves the broadly conceived reach of a search and seizure under the fourth amendment."[151] Nevertheless, the fourth amendment is not to constrain all intrusions, but rather, only those which the circumstances do not justify, and those which are unreasonable.[152]

The Court held that the blood extraction was not an unreasonable search and seizure. The Court found that the police had probable cause to arrest the suspect for driving while intoxicated.[153] The Court nevertheless required the police to find a "clear indication" that they would discover incriminating evidence before they would be allowed to search beyond the surface of the body.[154] The police officers properly made this determination, not waiting to procure a warrant, because of the emergency nature of the situation—in the time it would have taken an officer to procure a warrant, the alcohol content in the blood could substantially dissipate because of natural body processes.[155] Finally, the Court held that the process of extracting the blood itself was not unreasonable because such tests are commonplace and effective.[156]

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constitutional provision to refuse to give a blood sample, and therefore his right to have counsel present to protect his constitutional rights was not infringed. *Id.* at 765-66.

149. *Id.* at 772.

150. *Id.* at 767. *See also* Wolf v. Colorado, 338 U.S. 25, 27 (1949) (security of one's privacy against arbitrary police intrusion is at core of fourth amendment and is "basic to a free society") (*overruled on other grounds*, Mapp v. Ohio, 367 U.S. 643 (1961)).

151. Schmerber v. California, 384 U.S. at 767. Stated the Court: "Such testing procedures plainly constitute searches of 'persons,' and depend antecedently upon seizures of 'persons,' within the meaning of the Fourth Amendment." *Id.*

152. *Id.* at 768.

153. *Id.* at 769. The Court stated that probable cause existed because the driver had alcohol on his breath; his eyes were bloodshot, watery, and had a "sort of glassy appearance"; and the suspect showed other symptoms of drunkenness. *Id.*

154. *Id.* at 770. Body searches are controlled by Terry v. Ohio, 392 U.S. 1 (1968). *Terry* involved a police officer's temporary detention of two men he suspected of planning a robbery. *Id.* at 5. The Court held that the officer could temporarily seize suspects and conduct a search limited in scope to a pat down of the outer body if the officer believed the suspect might be armed. *Id.* at 29-30.

155. Schmerber v. California, 384 U.S. at 770-71.

156. *Id.* at 771. The Court elaborated on this point, noting that experience with blood tests "teaches that the quantity of blood extracted is minimal, and that for most people the procedure involves virtually no risk, trauma, or pain. [The driver] is not one of the few who on the grounds of fear, concern for health, or religious scruple might prefer some other means of testing . . . ." *Id.* Further, the "test was performed in a reasonable manner," "by a physician in a hospital environment according to accepted medical practices." *Id. See also* Breithaupt v.

The United States Supreme Court held recently that the fourth amendment did prohibit a state from compelling a suspect to undergo surgery to recover a bullet, despite its previous holding in *Schmerber*. In *Winston v. Lee*[157] the police sought to recover a bullet from the suspect's chest in order to help prove the suspect's guilt in a robbery. The Court distinguished *Schmerber* on the ground that surgery is a much "more substantial intrusion" upon a suspect's fourth amendment rights,[158] while reconfirming the constitutionality of extracting blood in a *Schmerber*-type case.[159] The Court then held that, where other means of obtaining evidence exist and the intrusion upon the suspect's body involves a certain amount of health risk, such an intrusion would constitute an unreasonable search under the fourth amendment.[160]

2. *Fifth Amendment Analysis Under* Schmerber

The driver also challenged the admissibility of the blood test on the ground that it violated his fifth amendment privilege against self-incrimination.[161] The Court held that the withdrawal and use of a blood sample for purposes of chemical analysis did not violate the driver's fifth amendment rights.[162] The Court based its decision on the distinction between testimonial or communicative evidence, and acts noncommunicative in nature,[163]

Abram, 352 U.S. 432, 436 (1957), in which the Court stated:

> The blood test procedure has become routine in our everyday life. It is a ritual for those going into the military service as well as those applying for marriage licenses. Many colleges require such tests before permitting entrance and literally millions of us have voluntarily gone through the same, though a longer, routine on becoming blood donors. Likewise, we note that a majority of our States have either enacted statutes in some form authorizing tests of this nature or permit findings so obtained to be admitted in evidence.

157. Winston v. Lee, 470 U.S. 753 (1985).

158. *Id.* at 755, 763-66.

159. *Id.* at 761-62.

160. *Id.* at 766.

161. Schmerber v. California, 384 U.S. at 760-65.

162. *Id.* at 761.

163. *Id.* and n.5. The Court took note of the facially opposite view it expressed in Miranda v. Arizona, 384 U.S. 436, 460 (1966), in which the Court stated:

> All these policies point to one overriding thought: the constitutional foundation underlying the privilege is the respect a government—state or federal—must accord the dignity and integrity of its citizens. To maintain a "fair state-individual balance," to require the government "to shoulder the entire load" . . . to respect the inviolability of the human personality, our accusatory system of criminal justice demands that the government seeking to punish an individual produce the evidence against him by its own independent labors, rather than by the cruel, simple expedient of compelling it from his own mouth.

(Citation omitted.) The Court acknowledged that compelled submission to a blood test violates the "inviolability of the human personality" and the requirement that the government produce evidence "by its own independent labors." Schmerber v. California, 384 U.S. at 762. But, the

citing *Holt* as precedent.[164] The Court accepted, at least "in this case," the proposition that the fifth amendment privilege against self-incrimination constitutes "a bar against compelling 'communications' or 'testimony,' " but not against compelling production of "real or physical evidence" from a suspect.[165]

In an important footnote to its discussion of the fifth amendment, the Court stated that its holding might not apply in a situation in which "the state tried to show that the accused had incriminated himself when told that he would have to be tested."[166] The Court expressed its fear that such evidence could be obtained as a result of coercion, especially of an individual who feared the test, or opposed it on religious grounds.[167] Situations might occur, according to the Court, where "the pain, danger, or severity of an operation would almost inevitably cause a person to prefer confession to undergoing the 'search.' "[168] The Court expressly reserved its judgment on this issue, relying on the absence of such facts in the case at bar.[169]

3. *Fourteenth Amendment Analysis Under* Schmerber

The driver also claimed a violation of his right to due process under the fourteenth amendment.[170] The Court summarily dismissed this challenge. The Court stated that there was "nothing in the circumstances of this case or in the supervening events" to offend its sense of justice.[171] In so holding, the court distinguished, but did not overrule, *Rochin v. California*.[172]

In *Rochin* a police officer spotted two capsules on a night stand as he was arresting a suspect. When asked to whom the capsules belonged, the suspect quickly swallowed them.[173] After failing in an attempt at physically removing the capsules from the suspect's mouth, the police took him to a hospital. There doctors forced an emetic solution into the suspect's stomach until he vomited the capsules.[174] The capsules contained morphine and were admitted into evidence against the suspect at trial. The Court held that the method by which the police seized the capsules violated the suspect's right

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Court noted, the *Miranda* passage itself recognizes that "the privilege has never been given the full scope which the values it helps to protect suggest." *Id.*

164. Schmerber v. California, 384 U.S. at 763.

165. *Id.* at 764. The Court noted, however, that this distinction between real or physical evidence and communication or testimony may not be valid in all circumstances. *Id.*

166. *Id.* at 765 n.9.

167. *Id.*

168. *Id.*

169. *Id.*

170. *Id.* at 759.

171. *Id.*

172. Rochin v. California, 342 U.S. 165 (1952).

173. *Id.* at 166.

174. *Id.*

to due process under the fourth amendment.[175] The Court believed that giving such power to police violated the community's sense of justice.[176]

V. Toward a Procedure for Handling DNA Fingerprints in Criminal Cases

Case law involving compelled cooperation of criminal suspects in making positive identification of themselves indicates that the government could force a suspect to surrender a blood sample in order to allow authorities to conduct a DNA fingerprinting test without violating the fourth or fifth amendments. Neither the fourth amendment right against unreasonable searches and seizures, nor the fifth amendment privilege against self-incrimination, appears to prohibit the government from forcibly taking blood samples from a suspect. Nevertheless, respect for human dignity and the inviolability of the person—values that require protection under the fourteenth amendment due process clause—dictates that the government refrain from exercising such powers. Suspects should not be forced to give blood samples against their will.[177] Yet the government has a compelling interest in having the best evidence possible. Therefore, refusal to submit to a DNA fingerprinting test should be admissible against a suspect as circumstantial evidence of guilt.[178] This approach prevents the government from assuming a barbaric image, while maintaining pressure on suspects to cooperate in helping the government arrive at the truth.

A. *DNA Fingerprinting Under Constitutional Scrutiny*

Compelling criminal suspects to provide blood samples should not violate either fourth or fifth amendment protections as long as established constitutional principles are followed. As the earlier constitutional analysis indicated, compelling criminal suspects to surrender blood samples does not violate the fourth amendment right against unreasonable searches and seizures, provided that government officials act upon probable cause and

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175. *Id.* at 174.

176. *Id.* at 173. Specifically, the Court stated that:

> To attempt in this case to distinguish what lawyers call "real evidence" from verbal evidence is to ignore the reasons for excluding coerced confessions. Use of involuntary verbal confessions in state criminal trials is constitutionally obnoxious not only because of their unreliability. They are inadmissible under the Due Process Clause even though statements contained in them may be independently established as true. Coerced confessions offend the community's sense of fair play and decency. So here, to sanction the brutal conduct . . . would be to afford brutality the cloak of law. Nothing would be more calculated to discredit law and thereby to brutalize the temper of a society.

Id. at 173-74.

177. *See infra* text accompanying notes 191-97.

178. *See infra* text accompanying notes 198-214.

have obtained a proper search warrant, or that exigent circumstances exist which justify reliance on the police, rather than on a magistrate, to find a "clear indication" that incriminating evidence will be discovered.[179] Because DNA fingerprinting tests rely on a molecular structure that exists in every cell in the human body,[180] the possibility of conducting the test will not dissipate with time.[181] Consequently the government will not be able to argue the existence of exigent circumstances. Therefore, the government should not be allowed to take a blood sample for purposes of DNA fingerprinting tests without first obtaining a proper search warrant from an independent magistrate.[182]

Requiring a search warrant before the government can take a blood sample from a criminal suspect provides adequate protection of the fourth amendment right against unreasonable searches and seizures. To obtain a warrant the police will have to show probable cause to believe that a DNA fingerprint test will incriminate the suspect.[183] A warrant requirement will prevent the police from gathering up a number of suspects to test them all in order to arrive at their prime suspect through a process of elimination.[184]

The DNA fingerprinting process is not otherwise unreasonable because the drawing of a blood sample is "commonplace" and the "quantity of blood extracted is minimal, and . . . for most people the procedure involves virtually no risk, trauma, or pain."[185] Because the world is currently experiencing

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179. *See supra* text accompanying notes 149-56. While taking blood samples is quite clearly covered by the fourth amendment, the taking of hair samples may not be. *See* W. LAFAVE & J. ISRAEL, CRIMINAL PROCEDURE § 3.4 (1985).

180. *See supra* text accompanying notes 17-20.

181. DNA fingerprinting can be performed on samples which are several years old. *See supra* text accompanying notes 30-34.

182. The fourth amendment's warrant requirement means that inferences suggestion probable cause must "be drawn by a neutral and detached magistrate instead of being judged by the officer engaged in the often competitive enterprise of ferreting out crime." Johnson v. United States, 333 U.S. 10, 13-14 (1948). *See also* Aguilar v. Texas, 378 U.S. 108, 110-11 (1964) (citing United States v. Lefkowitz, 285 U.S. 452, 464 (1932)). The Court in *Schmerber* agreed that a neutral magistrate's detached and deliberate determination is "indisputable and great" when the issue is whether to invade a person's body in a search. Schmerber v. California, 384 U.S. at 770.

183. The fourth amendment requires probable cause before a search can be lawful. *See* U.S. CONST. amend. IV. *See also* United States v. Harris, 403 U.S. 573, 584 (1971) (search warrant must be supported by probable cause); Chambers v. Maroney, 399 U.S. 42, 51 (1970) (search unreasonable unless warrant supported by probable cause).

184. *Cf.* Davis v. Mississippi, 394 U.S. 721, 726-27 (1969) (fingerprints obtained during brief detention of persons seized in police dragnet inadmissible in evidence when no probable cause was shown for fingerprinting a particular defendant). Presumably this would not prevent the police from asking particular suspects, or a large segment of the populace, to submit blood samples voluntarily. In a murder and rape investigation in England, authorities asked 4,000 local men to submit blood samples in order to try to identify the criminal. *See* Begley, *supra* note 2, at 81.

185. Schmerber v. California, 384 U.S. at 771.

an AIDS epidemic, the question arises whether the extraction of blood is still safe and reasonable. The Red Cross, however, states that the extraction of blood is completely safe provided it is performed in a sterile atmosphere by trained and competent individuals.[186] Therefore, obtaining blood samples from suspects for the purpose of conducting DNA fingerprinting analysis does not violate the fourth amendment right against unreasonable searches and seizures.

Compelling a suspect to provide a blood sample for DNA fingerprinting analysis does not violate the fifth amendment privilege against self-incrimination either. A long line of cases have excluded such "body evidence" from fifth amendment protection because it does not constitute communication.[187] Although blood samples do not constitute communication, compelling suspects to provide a blood sample undoubtedly requires suspects to produce evidence against themselves. This does not, however, violate the fifth amendment.

The danger exists, in some cases at least, that suspects may be sincerely frightened of even the simplest blood extraction, or may find that it violates their religious beliefs, to the extent that they would feel compelled to incriminate themselves orally rather than submit to a blood test.[188] Any communication that threatens use of the blood test will certainly raise fifth amendment concerns. If a suspect made statements out of a desire to avoid the DNA fingerprinting test because of fear or religious beliefs, those statements would presumably be the result of coercion and would not be admissible against the suspect.[189] In such a case the government would be able to rely on the blood test results, but not on any statements produced by fear of the test.[190]

Extracting blood samples from suspects in order to conduct DNA fingerprinting analysis, however, does infringe upon the fifth and fourteenth

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186. Author's discussion with Red Cross personnel, Feb. 24, 1988. *See also* Red Cross Pamphlet (1986) ("You cannot get AIDS or any infectious disease by donating blood or plasma.").

187. *See, e.g.*, United States v. Dionisio, 410 U.S. 1, 5-6 (1973) (fifth amendment challenges to compelled voice exemplar rejected); Gilbert v. California, 388 U.S. 263, 266 (1967) (compelled handwriting exemplar not violation of fifth amendment); United States v. Wade, 388 U.S. 218, 221 (1967) (compelling suspect to repeat robber's words not violation of fifth amendment). *See also* Arenella, Schmerber *and the Privilege Against Self-Incrimination: A Reappraisal* 20 AM. CRIM. L. REV. 31, 38-40 (1982) (Court has relied on *Schmerber* distinction between testimonial and physical evidence).

188. This is precisely the fear that the *Schmerber* Court expressed in its opinion. *See* Schmerber v. California, 384 U.S. at 765 n.9.

189. Although it noted the problem, the *Schmerber* Court refrained from resolving this issue, stating that the facts were not available in the case before it to support such a charge. *Id.*

190. The *Schmerber* Court noted that if the government "wishes to compel persons to submit to such attempts to discover evidence, the [government] may have to forgo the advantage of any *testimonial* products of administering the test—products which would fall within the privilege." *Id.*

amendments' due process clauses. The fourteenth amendment requires a balancing approach wherein the government's interest in effective law enforcement is weighed against the individual's right to privacy and human dignity. Although the government has a compelling interest in this situation, the due process clause must prohibit compelled submission to DNA fingerprint testing because the government's interest can be substantially achieved by a means less restrictive of individual rights.

The government has a substantial interest in obtaining convincing and reliable evidence for use in effective law enforcement.[191] Further, courts have already held that taking blood samples is a fairly simple and painless process.[192] Provided that trained and competent medical personnel extract the blood sample at a proper medical facility, the process should not shock the community's conscience.[193]

It should shock the community's conscience, however, if the police are allowed physically to restrain suspects while blood is extracted from their bodies. Extraction of blood for DNA fingerprinting differs from the occasional extraction in *Schmerber*-type situations because the probability exists that, when the technique becomes generally accepted, an extremely large number of suspects will be required to provide blood samples. The process of extracting blood seems harmless if one assumes that suspects will be docile, but at least some suspects will not cooperate. Permitting the government to force suspects to give blood samples raises a specter of coercion which should not be tolerated under the Constitution.[194] One cannot escape an uneasy feeling when imagining a country in which the law condones the use of physical force to subdue people while blood samples are drawn from their bodies. As the *Schmerber* Court stated, "compelled submission fails to respect the inviolability of the human personality."[195] It is incongruous to have a constitutional interpretation which holds that "to convict a [suspect] the police cannot extract by force what is in [the suspect's] mind," but can extract by force what is in the suspect's body.[196] The DNA fingerprinting

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191. *See* Arenella, *supra* note 187, at 32.

192. *See* Schmerber v. California, 384 U.S. at 771.

193. *See* Rochin v. California, 342 U.S. 165 (1952). In *Rochin* the Court stated: "Due process of law, as a historic and generative principle, precludes defining, and thereby confining, these standards of conduct more precisely than to say that convictions cannot be brought about by methods that offend 'a sense of justice.'" *Id.* at 173 (quoting Hughes, C.J., speaking for a unanimous court in Brown v. Mississippi, 297 U.S. 278, 285-86 (1936)).

194. The fact that police are not otherwise constrained by specific guarantees under the fourth or fifth amendment does not detract from the power of this argument. As the Court stated in *Rochin*, "[i]t has long since ceased to be true that due process of law is heedless of the means by which otherwise relevant and credible evidence is obtained." *Id.* at 172.

195. Schmerber v. California, 384 U.S. at 771.

196. Rochin v. California, 342 U.S. 165, 173 (1952). Similarly, "[i]t is a strange hierarchy of values that allows the state to extract a human being's blood to convict him of a crime because of the blood's content but proscribes compelled production of his lifeless papers." Schmerber v. California, 384 U.S. at 775 (Black, J., dissenting) (referring to Boyd v. United

test's reliability increases the likelihood of its use, and what may not shock the community's conscience when performed occasionally, may very well be impermissible when prosecutors use force to extract blood on a repeated and frequent basis. Finally, an alternative is available which will preserve the government's ability to enforce the law while simultaneously preserving individual rights—allow refusal to take the test to be entered into evidence against the suspect.[197] With this alternative available, the weight of the balancing test comes down in favor of an individual's right to refuse to take the test and against allowing the government forcibly to take blood samples.

B. *Refusal to Submit to DNA Fingerprinting Should Be Admissible as Circumstantial Evidence of Guilt*

This Article has concluded that a compelled extraction of a blood sample from a suspect would not violate a suspect's fourth or fifth amendment rights. Provided that a warrant is obtained based on a showing of probable cause, seizure of the blood would not violate a suspect's fourth amendment right against unreasonable searches and seizures. Admission of the blood test results, but not any communication made as a result of a desire not to submit to the blood test for fear or religious reasons, would not violate a suspect's fifth amendment privilege against self-incrimination. The inviolability of the human body, however, outweighs the compelling government interest in effective law enforcement and forced extraction of blood samples infringes upon due process rights under the fourteenth amendment. Therefore, a method must be developed for dealing with those situations in which a suspect refuses to provide a blood sample.[198] Although the government may compel submission to a DNA fingerprinting test without violating the fourth or fifth amendments, suspects should have the right to refuse to comply for any reason.[199] Consistent with the principles underlying the *Mi-*

States, 116 U.S. 616 (1886)).

197. *See infra* text accompanying notes 198-212.

198. In practice, most suspects will probably comply with a police request for a blood sample. *See* Note, *Constitutional Limitations on the Taking of Body Evidence*, 78 YALE L.J. 1074, 1081 (1969). Most suspects will cooperate out of a general respect for authority. *Id.* at 1082. Others may fear informal penalties, for "suspects may well feel that uncooperative conduct will bring less favorable treatment." *Id.*

A suspect might refuse to cooperate in providing a blood sample for several reasons. Guilty suspects may refuse because of their guilt. *Id.* at 1082 n.57. Or suspects may be trying to protect another or to expand their rights through fiat. *Id.* Finally, "resistance may spring from medical, religious, or dignitary objections or simple emotional shock and confusion." *Id.*

199. A number of states already follow this procedure with respect to blood tests for intoxicated drivers. KY. REV. STAT. ANN. § 186.565(3) (Michie/Bobbs-Merrill 1988) (person who refuses to submit to blood test shall be warned of consequences of refusal, but if he refuses again, none shall be given); MD. [TRANSP.] CODE ANN. § 16-205.1(a) (1987) (person may not be compelled to take chemical test for alcohol); N.M. STAT. ANN. § 66-8-111(a) (1978) (if person refuses to submit, no test will be given unless such person caused death or great bodily harm while under influence); OKLA. STAT. ANN. tit. 47 § 753 (1988) (if person refuses, no test shall be

randa[200] decision, police should be required to advise suspects of their right to refuse and of the results of their refusal.[201]

Because the government has such a compelling interest in obtaining the best possible evidence, suspects should be strongly encouraged to submit to DNA fingerprint testing. Toward this end, a suspect's refusal to submit to a blood test should be admissible in trial as circumstantial evidence of guilt. Evidence of refusal is, in many ways, as persuasive as evidence of the results of the test itself.[202] This procedure is currently used by many states in their drunk driving statutes.[203] Admission of refusal to comply serves the function of persuading suspects to submit to the test, while preserving to the government strong evidence of guilt regardless of the suspect's willingness to cooperate.[204]

Admission of the refusal to comply with a request to give a blood sample would not itself violate a suspect's fifth amendment privilege against self-incrimination. The *Schmerber* Court expressly refused to rule on this issue.[205] The United States Supreme Court faced a similar fact pattern, however, in *South Dakota v. Neville*.[206] In *Neville* a suspect arrested for drunk driving refused to submit to a blood alcohol test.[207] His refusal to submit to

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given unless reasonable cause exists to believe such person caused death or serious injury to another); TENN. CODE ANN. § 55-10-406(a)(2) (1988) (if person refuses, the law enforcement officer will advise the driver that a refusal will result in suspension of his license by the court); TEX. REV. CIV. STAT. ANN. art. 67011-5 § 2(a) (Vernon 1988) (if person refuses, no test given).

200. *See* Miranda v. Arizona, 384 U.S. 436, 444-45 (1966) (warnings are part of the procedural safeguards thought necessary to protect the constitutional rights of the accused).

201. Notice of the right to refuse to give a blood sample serves two purposes. First, warnings inform suspects of their rights, which enhances the free and intelligent exercise of those rights. Second, because the warning includes a statement of the consequences of refusal—that the act of refusing will be entered into evidence against the suspect—the warnings also assist the police. The warnings provide coercive effect which acts to persuade the suspect to cooperate. *See* South Dakota v. Neville, 459 U.S. 553, 566 n.17 (1983) (in drunk driving case, Court stated: "Since the State wants the suspect to submit to the test, it is in its interest fully to warn suspects of the consequences of refusal.").

202. *See* People v. Ellis, 65 Cal. 2d 529, 537-38, 421 P.2d 393, 397, 55 Cal. Rptr. 385, 389 (1966) (evidence of refusal to take test shows consciousness of guilt). *See also* J. WIGMORE, EVIDENCE §§ 273-76 (1979). On the other hand, evidence that a suspect wants to undergo a DNA fingerprinting test is strong evidence that the suspect is *innocent*. Gary Dotson's attorney, Thomas Breen, stated that Dotson's willingness to undergo a test which, as explained to him, could prove positively his guilt or innocence presented Breen with "every indication that [Dotson] is absolutely innocent." Haller, *supra* note 25, at 23.

203. Concomitant with the right to refuse the test, some states provide that the prosecution can admit the refusal into evidence against the suspect. KY. REV. STAT. ANN. § 186.565(4) (Bobbs-Merrill 1988) (refusal admitted in evidence in hearing to suspend license); OKLA. STAT. ANN. tit. 47 § 756 (West 1988) (evidence person refused test admissible in a criminal or civil action); TEX. STAT. ANN. art. 67012-5 (Vernon 1988) (refusal admissible).

204. *See supra* text accompanying note 198.

205. Schmerber v. California, 384 U.S. at 765 n.9.

206. South Dakota v. Neville, 459 U.S. 553 (1983).

207. *Id.* at 554-55.

the test was introduced as evidence against him.[208] The Court noted that the state had the right under *Schmerber* forcibly to take a blood sample.[209] The Court reasoned that, because the state could have gone farther than it did, it could certainly "choose instead to avoid confrontation" and submit the refusal to cooperate into evidence.[210] The Court went on to note that "most courts have reasoned that refusal to submit to a blood test is a physical act rather than communicative"; therefore refusal is not protected by the fifth amendment.[211] The Court declined to rely on this last factor, though, preferring to base its holding on the ground that the state did less than it had a constitutional right to do.[212]

Permitting a suspect to refuse to comply with a request to provide a blood sample for DNA fingerprint testing preserves the human dignity necessary for a civilized society. At the same time, allowing admission of the refusal to cooperate into evidence serves the compelling state interest in obtaining the best possible evidence.[213] Because the use of DNA fingerprinting could become pervasive, it is necessary to develop an approach which balances the governmental need for effective law enforcement against the individual need for dignity.[214] The approach advocated by this Article achieves that balance in the most equitable way possible.

VI. Conclusion

The advent of the DNA fingerprinting process may well bring a revolu-

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208. *Id.* at 555.

209. *Id.* at 559.

210. *Id.*

211. *Id.* at 560-61. *See, e.g.*, Welch v. District Court, 594 F.2d 903, 905 (2d Cir. 1979) (refusal to submit to blood test not communicative and not barred by fifth amendment); Newhouse v. Misterly, 415 F.2d 514, 518 (9th Cir. 1969) (same); Hill v. State, 366 So. 2d 318, 324-25 (Ala. 1979) (same); Campbell v. Superior Court, 160 Ariz. 542, 544, 479 P.2d 685, 688 (1971) (same). *Cf.* State v. Haze, 218 Kan. 60, 63, 542 P.2d 720, 724 (1973) (refusal to give handwriting exemplar).

In People v. Ellis, 65 Cal. 2d 529, 421 P.2d 393, 55 Cal. Rptr. 385 (1966), Judge Traynor held that a suspect's refusal to display his voice was not testimonial evidence. Traynor explained that "evidence of refusal to take a potentially incriminating test is similar to other circumstantial evidence of consciousness of guilt, such as escape from custody and suppression of evidence." *Id.* at ____, 421 P.2d at 397, 55 Cal. Rptr. at ____.

But see Johnson v. State, 125 Ga. App. 607, 609, 188 S.E.2d 416, 418 (1972) (introduction of refusal evidence unconstitutional) (overruled by Wessels v. State, 169 Ga. App. 246, 312 S.E.2d 361 (1983)); State v. Andrews, 297 Minn. 264, 266, 212 N.W.2d 864, 867 (1973) (same); Dudley v. State, 548 S.W.2d 706, 708 (Tex. Crim. App. 1977) (same); State v. Adams, 247 S.E.2d 475, 477 (W. Va. 1978) (same) (overruled by State v. Cozart, 352 S.E.2d 152 (W. Va. 1987)).

212. South Dakota v. Neville, 459 U.S. at 561.

213. *But see generally* Arenella, *supra* note 187 (author argues that refusal should not be substituted as evidence for more reliable physical evidence).

214. *Id.* at 39 ("need to balance conflicting concerns of fairness to the accused against the state's legitimate need to secure reliable information of wrongdoing").

tion to the criminal law, and the criminal law had better prepare. This Article has addressed two issues the advent of DNA fingerprinting is bound to raise. First, this Article concluded that DNA fingerprinting analysis has not demonstrated enough reliability at this time that it should be generally admissible in the criminal courts of America. The Article did conclude, however, that the added scientific support needed to demonstrate the technique's reliability will be forthcoming, eventually resulting in the general acceptance of the DNA fingerprinting test into evidence. Second, this Article concluded that, although compelled extraction of a blood sample for purposes of the DNA fingerprinting test would not violate the fourth or fifth amendments to the Constitution, it would violate the fourteenth amendment due process clause. By allowing prosecutors to submit evidence that a suspect refused to submit to the blood test, however, courts could preserve individual rights under the due process clause while enabling the government to further its compelling interest in law enforcement. Although more questions will arise if DNA fingerprinting actually becomes as common as conventional fingerprinting, this Article has sought to establish a framework for addressing at least two major issues which are certain to arise.