

# PRELUDE TO A MISS: A CAUTIONARY NOTE AGAINST EXPANDING DNA DATABANKS IN THE FACE OF SCIENTIFIC UNCERTAINTY

## INTRODUCTION

*"DNA fingerprinting is all but foolproof,  
but some fool is going to use it."*<sup>1</sup>

Probably one of the most striking facts about George Orwell's 1984<sup>2</sup> in the minds of his 1949 audience was how markedly his portrayal of life in the future differed from what was known at the time. Even more striking, perhaps, was that his depiction of society reflected the notion that these changes had occurred slowly, almost imperceptibly, over time. The same might be said of the use of deoxyribonucleic acid (DNA) as a means of criminal identification. Some have hailed it as "an infallible mix of science and magic"<sup>3</sup> and "the single biggest advancement in forensic science in 100 years,"<sup>4</sup> while others have analogized it to atomic power, with its enormous potential to work either good or evil.<sup>5</sup>

States initially employed DNA analysis in their forensic investigations only after they had identified the probable suspect in the case. At that point, a sample of the suspect's blood was taken and its DNA analyzed and compared with the DNA evidence obtained from the scene of the crime.<sup>6</sup> Recently, however, the use of DNA for identification purposes has fundamentally changed. The United States Department of Defense has created a DNA databank of all active American service members that will be used to identify unknown soldiers killed in future battles.<sup>7</sup> Moreover, Congress and many state legislatures have passed laws requiring convicted felons, violent criminals, and sex offenders to give blood samples from

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1. OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, GENETIC WITNESS: FORENSIC USES OF DNA TESTS I (1990) (quoting Anonymous) [hereinafter GENETIC WITNESS].

2. GEORGE ORWELL, 1984 (1949).

3. Naftali Bendavid, *DNA: What the Code Won't Unlock; In the Search for Evidence, Our Faith in Science Can Lead Us Astray*, WASH. POST, Aug. 14, 1994, at C3 ("The public has come to see DNA testing as an infallible mix of science and magic, with the power to exonerate or incriminate, able to prove someone guilty or innocent of a horrible crime even months after the incident.").

4. *Id.* (quoting Paul Ferrara, director of Virginia's Division of Forensic Sciences).

5. Paula Span, *The Gene Team: Innocence Project Fights Misjustice with DNA Testing*, WASH. POST, Dec. 14, 1994, at C1 ("People tend to describe DNA testing in dramatic terms reminiscent of the way atomic power was portrayed in the '50s: all that enormous potential for good or for evil.").

6. *See, e.g.*, *State v. Anderson*, 881 P.2d 29 (N.M. 1994).

7. Wendy Melillo, *The Cutting Edge—Genetic Record Will Help Identify Unknown Soldiers*, WASH. POST, Jan. 14, 1992, at A5.

which a DNA profile will be obtained and entered into a central DNA databank.<sup>8</sup>

Although these criminal DNA databanks will undoubtedly prove useful in solving crimes, their primary shortcoming is that criminals must first commit a crime before their DNA can be collected and later used to identify them in subsequent crimes. If the government wishes to protect its citizens by using DNA to identify criminals the first time they commit a crime, it will have to look to other measures.

One alternative is to round up an entire community after a crime has been committed, procure a DNA sample from each person, and then compare it against the sample gathered at the scene of the crime. The United States military took such action after the two-year-old daughter of a U.S. Army sergeant was raped and murdered in Babenhausen, Germany.<sup>9</sup> Police had obtained the murderer's DNA profile from a minute amount of semen left on the victim's body, but they had no suspects in the case.<sup>10</sup> In order to identify the perpetrator, police began a "massive DNA screening program" of every male who had been near the child's housing complex on the night of her murder and compared these DNA profiles to the DNA retrieved from the victim.<sup>11</sup> Within weeks, Specialist Patrick Smith was a suspect, and he later pleaded guilty to the charges against him.<sup>12</sup>

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8. 42 U.S.C. §§ 14131-14134 (1995); ARIZ. REV. STAT. ANN. § 31-281 (Supp. 1995); DEL. CODE ANN. tit. 29, § 4713 (Supp. 1994); FLA. STAT. ANN. § 943.325 (West Supp. 1996); GA. CODE ANN. §§ 24-4-60 to 24-4-65 (1995); HAW. REV. STAT. § 706-603 (1993); IND. CODE ANN. §§ 20-12-34.5-1 to 20-12-34.5-6 (Burns 1991); IOWA CODE ANN. § 13.10 (West 1995 & Supp. 1995); IOWA CODE ANN. §§ 901.2, 906.4 (West 1994); KAN. STAT. ANN. § 21-2511 (1995); KY. REV. STAT. ANN. §§ 17.170, 17.175 (Michie/Bobbs-Merrill 1992); LA. REV. STAT. ANN. § 15:578 (West 1992 & Supp. 1996); MINN. STAT. ANN. §§ 299C.155, 609.3461 (West 1991 & Supp. 1996); MO. ANN. STAT. § 650.050 (Vernon Supp. 1996); NEV. REV. STAT. ANN. §§ 176.111, 179A.075 (Michie 1992 & Supp. 1995); N.J. STAT. ANN. §§ 53:1-20.17 to 53:1-20.18 (West Supp. 1995); N.C. GEN. STAT. §§ 15A-266 to 15.A-266.12 (Supp. 1995); OHIO REV. CODE ANN. § 109.573 (Page Supp. 1995); OKLA. STAT. ANN. tit. 57, § 584 (West Supp. 1996); OR. REV. STAT. §§ 137.076, 181.085 (1995); S.D. CODIFIED LAWS ANN. §§ 23-5-14 to 23-5-18 (Supp. 1995); TENN. CODE ANN. § 38-6-113 (Supp. 1995); TEX. GOV'T CODE ANN. § 411.142 (West Supp. 1996); VA. CODE ANN. §§ 19.2-310.2 to 19.2-310.7 (Michie 1995); WASH. REV. CODE §§ 43.43.752 to 43.43.759 (West Supp. 1996); W. VA. CODE §§ 15-2B-1 to 15-2B-12 (West Supp. 1995).

9. Rick Atkinson, *DNA Samples Catch American Killer of Toddler in Germany*, WASH. POST, Jan. 1, 1995, at A27.

10. *Id.* at A31.

11. *Id.*

12. *Id.* at A27. Smith was charged with murder after police also matched fibers found on the victim's body to Smith's clothing. *Id.* at A31. When Smith pleaded guilty to the charges, he told the court that, although he could remember nothing, the evidence convinced him that he had killed the child. *Id.*

A more efficient alternative is to create a national DNA databank<sup>13</sup> containing the DNA profile of each citizen.<sup>14</sup> One advantage of a national DNA databank is that, instead of requiring weeks to round up and test potential suspects, DNA obtained from the scene of the crime could be tested against the established databank and the suspect quickly identified. Another advantage is that, whereas roundups are confined to a specific area, a national DNA databank could be used to identify criminals no matter where they are.

It is both feasible and conceivable that the United States Supreme Court would allow the creation of a national DNA databank. While the Court's earlier cases required a showing of probable cause before allowing a search or seizure to proceed, more recent decisions allow the search or seizure to proceed as long as it is reasonable.<sup>15</sup> As the Court has weakened Fourth Amendment protections, it has also created a more lenient standard for the admissibility of scientific evidence in the courtroom.<sup>16</sup> Thus, if a national DNA databank were created in the interest of public safety, it is likely that evidence linking a suspect's DNA to samples found at the scene of the crime would be admissible at trial.

This Note explores how the creation of a national DNA databank could be held constitutional, given the government's interest in solving

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13. In this Note, the term "national DNA databank" refers to a databank composed of the DNA of each American citizen. This term is contrasted with the term "criminal DNA databank," which refers to a databank that is only composed of the DNA of felons, violent criminals, and sex offenders.

14. Currently, neither the states nor the federal government has suggested creating a national DNA databank. However, several states have already expanded the use of their criminal DNA databanks to encompass the DNA profiles of more than convicted felons, violent criminals, and sex offenders. For example, South Dakota does not require individuals to be convicted of a sexual offense before obtaining their DNA profile; the statute is triggered as soon as the individuals are "taken into custody." ANDRE A. MOENSSENS ET AL., *SCIENTIFIC EVIDENCE IN CRIMINAL CASES* 959 (4th ed. 1995). In addition, Iowa's statute applies to both "felonies and indictable misdemeanors." *Id.* The Minnesota and Tennessee statutes extend to juvenile delinquents who have committed sexual offenses. *Id.* Virginia's statute applies to convicted felons, which includes burglars and tax evaders, groups "who are unlikely to leave biological samples at crime sites or to repeat their offenses." Nachama L. Wilker et al., *DNA Data Banking and the Public Interest*, in *DNA ON TRIAL* 141, 144 (Paul R. Billings, ed., 1992). Thus, even though the states do not currently require the DNA testing of all citizens, such an event is not implausible and may be desirable.

15. For a discussion of the gradual erosion of Fourth Amendment protection, see *infra* Part II.B. See also Sheryl H. Love, Note, *Allowing New Technology to Erode Constitutional Protections: A Fourth Amendment Challenge to Non-Consensual DNA Testing of Prisoners*, 38 *VILL. L. REV.* 1617, 1628 n.68 (1993) ("Reasonableness is thus the touchstone of Fourth Amendment analysis . . .").

16. See *infra* Part II.C for a discussion of the United States Supreme Court's lower standard of admissibility of scientific evidence.

crimes and uniquely identifying criminal perpetrators.<sup>17</sup> The Note argues that, although such a databank could be legally established, it should nevertheless be prohibited because of current procedural uncertainties. Part I summarizes the process of DNA profiling and explains how DNA is a unique means of identification. Part II explores the criminal DNA databank recently authorized by Congress and shows how the enabling language of the statute could allow Congress to expand it into a national DNA databank. This part then analyzes the Court's recent treatment of Fourth Amendment challenges and illustrates how the creation of a national DNA databank could be held constitutional under the Fourth Amendment. Further, this part explains how evidence of a sample, declared to match a sample left at the scene of a crime, could be admitted into evidence against a defendant identified through a national DNA databank. Part III examines the potential dangers involved if a suspect were identified through a national DNA databank. These dangers include the rate of error of current testing procedures, the lack of industry standards and regulation, and juror tendency to overvalue scientific evidence. This part demonstrates that, when these factors are considered together, people labelled as suspects through a national DNA databank would find it exceedingly difficult to successfully defend themselves at trial. Finally, this Note concludes that although a national DNA databank could be legally established, given current profiling and regulatory problems, it would lead to the conviction of innocent persons and should not be created.

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17. The federal government's desire to establish a means of uniquely identifying individuals is not a recent phenomenon. For example, social security numbers were initially created in 1936 for the limited purpose of facilitating administration of the Social Security Act. Stephen Mayer, *Privacy and the Social Security Number: Section 1211 of the Tax Reform Act of 1976*, 6 RUTGERS J. COMPUTERS & L. 221, 223 (1978). Each social security number uniquely identified a particular social security recipient. 20 C.F.R. § 422.103(a) (1995). The use of the numbers was essentially confined to social security programs until the early 1960s; at that time, use of the social security number as a means of identifying individuals expanded into other government programs and even into the civil context. Mayer, *supra*, at 223. Although, in theory, other uses may be prohibited by the federal Privacy Act, 5 U.S.C. § 552(a) (1994), in practice, individuals may be required to provide their social security numbers on everything from loan applications to school grade reports. Even though the first criminal DNA databanks were only recently created, commentators have predicted that, in the future, databanks will include uses not originally contemplated. See Wilker, *supra* note 14, at 146.

## I. DNA PROFILING PROCEDURES

"People have a right not to be wrongly convicted of a crime."<sup>18</sup>

The concept of the gene was first recognized in 1865 by Gregor Mendel, based on his experiments with the garden pea.<sup>19</sup> Mendel's observations formed the foundation of the science of genetics—the study of heredity and biological variation.<sup>20</sup> It was not until the 1970s, however, that scientists understood which particular components of a gene were common to all members of a species and which varied among individuals.<sup>21</sup> This discovery paved the way for using variability between members of a species as a means of absolute identification based on genetics alone.<sup>22</sup>

Every living organism has a characteristic physical appearance, or phenotype.<sup>23</sup> The DNA within the genes carries the code of heredity for the organism and determines the expression of features that are both common to a species and unique to an individual.<sup>24</sup> In humans, the DNA molecule is shaped like a twisted ladder and is called a double helix.<sup>25</sup> The sides of the ladder are comprised of deoxyribose sugar and a phosphate group,<sup>26</sup> while the rungs consist of a nucleotide base (adenine, guanine, thymine, or cytosine).<sup>27</sup> These bases bond in pairs<sup>28</sup> (and are thus referred to as base pairs), and the order in which the pairs appear constitutes the unique genetic code for the cell.<sup>29</sup>

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18. NATIONAL RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE 1, 156 (1992) [hereinafter NRC REPORT].

19. LORNE T. KIRBY, DNA FINGERPRINTING: AN INTRODUCTION 1, 7 (1990). Kirby states that the term "gene" was not coined until the early 1900s by the Danish plant scientist, W. Johannsen. *Id.*

20. *Id.* See also NRC REPORT, *supra* note 18, at 32.

21. NRC REPORT, *supra* note 18, at 27-28.

22. *Id.*

23. KIRBY, *supra* note 19, at 1.

24. NRC REPORT, *supra* note 18, at 2. See also *id.* at 33 ("[Genes] constitute the blueprint for the structure of proteins of various types that are responsible for the makeup and function of cells and the body as a whole.").

25. *State v. Anderson*, 881 P.2d 29, 32 (N.M. 1994).

26. *Id.*

27. *Id.*

28. David H. Kaye, *DNA Evidence: Probability, Population Genetics, and the Courts*, 7 HARV. J.L. & TECH. 101, 107 (1993). Cytosine on one strand always pairs with guanine on the other, and similarly, adenine always pairs with thymine. *Id.*

29. *Anderson*, 881 P.2d at 32.

In humans, DNA appears in all cells having a nucleus,<sup>30</sup> and it is divided into pairs of chromosomes<sup>31</sup>—one set inherited from the mother and the other set inherited from the father.<sup>32</sup> Inheritable characteristics are determined by the pairs of genes, or alleles,<sup>33</sup> that occupy the same sites, or loci, on paired chromosomes.<sup>34</sup> Over ninety-nine percent of these genes are identical among all humans; the remaining genes are called polymorphic because they vary among individuals.<sup>35</sup> Although some polymorphic genes code for traits such as eye or hair color, others do not appear to have any coding function.<sup>36</sup> These noncoding, polymorphic genes consist of varying lengths of repeating sequences of base pairs and are highly variable among individuals; thus, they are often referred to as variable number tandem repeats (VNTRs).<sup>37</sup> Although all humans have the same sequence of base pairs at these VNTR loci, the number of times the sequence repeats itself is unique to each individual.<sup>38</sup> It is the VNTR loci that are of most interest and use to forensic scientists.<sup>39</sup>

The most common method of analyzing the VNTRs is referred to as restriction fragment length polymorphism (RFLP).<sup>40</sup> Prior to RFLP analysis, the DNA is extracted from a sample, purified, and cut into segments using restriction enzymes.<sup>41</sup> These enzymes act like chemical

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30. NRC REPORT, *supra* note 18, at 2. These nucleated cells include the cells surrounding hair roots, cells in saliva, sperm, and white blood cells. *Id.* The average human possesses an estimated one hundred trillion cells and, thus, a significant supply of DNA. KIRBY, *supra* note 19, at 8.

31. KIRBY, *supra* note 19, at 8.

32. NRC REPORT, *supra* note 18, at 32.

33. An allele refers to the alternative forms of a gene at a given site. *See id.* For example, different alleles of a gene may yield blue eyes, green eyes, or brown eyes in a given individual.

34. *Anderson*, 881 P.2d at 32.

35. *Id.* at 32-33.

36. *Id.* at 33.

37. *Id.* *See also* Kenneth R. Kreiling, *DNA Technology in Forensic Science*, 33 JURIMETRICS J. 449, 451 (1993) (commenting that, because VNTR genes do not appear to serve any function, they are sometimes referred to as "junk DNA").

38. *Anderson*, 881 P.2d at 33. Recall, however, that identical twins do possess the same DNA sequence. William C. Thompson & Simon Ford, *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests*, 75 VA. L. REV. 45, 61 (1989).

39. *Anderson*, 881 P.2d at 33.

40. Kreiling, *supra* note 37, at 451. Thompson and Ford also discuss a method known as polymerase chain reaction (PCR), in which a small sample is replicated thousands or millions of times in order to yield a larger sample that is then capable of analysis. Thompson & Ford, *supra* note 38, at 76-77. The PCR process is similar to the process by which cells replicate their DNA. *Id.* Thus, it is fundamentally no different from analytical procedures that utilize unamplified samples. The benefit of the PCR procedure is that samples which would otherwise be considered too small to test may be analyzed; the drawback of the procedure is that the results are less specific and are therefore not as indicative of a suspect's guilt or innocence. *Id.* at 50.

41. Kreiling, *supra* note 37, at 451.

scissors<sup>42</sup> that cut the DNA segment whenever they encounter a specific base pair sequence that is unique to the enzyme.<sup>43</sup> Because the number of times that a VNTR sequence appears varies among individuals, the restriction enzyme will yield fragments that also vary in length from individual to individual.<sup>44</sup> However, because a person's entire genetic makeup consists of billions of units, it is impossible for each VNTR to be analyzed.<sup>45</sup> Typically, only three to five VNTRs are examined during an RFLP analysis.<sup>46</sup>

Once the samples have been segmented, they are ready for analysis. In the "Southern blot" analysis,<sup>47</sup> the fragments are separated by length by placing them in a gel and applying an electrical current, causing the shorter fragments to travel farther through the gel than the longer fragments.<sup>48</sup> After transferring the pattern from the gel onto a durable membrane, the fragments are then separated into two complementary strands—one genetic strand inherited from the suspect's mother and the other inherited from the suspect's father.<sup>49</sup> These single strands are bound to radioactive probes, and a photo image, or autoradiograph (autorad), is created.<sup>50</sup> The autorad contains bar images of different lengths, resulting from each strand's distinct length of travel.<sup>51</sup> This is the means by which a suspect's DNA is compared to an evidence sample that has undergone the same analysis.<sup>52</sup>

When two DNA profiles are compared to each other, they are first visually examined by an analyst.<sup>53</sup> If the autorads are clearly different from each other, the analyst declares a non-match.<sup>54</sup> If, on the other hand,

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42. *Anderson*, 881 P.2d at 33.

43. NRC REPORT, *supra* note 18, at 3.

44. *Thompson & Ford*, *supra* note 38, at 67-68.

45. *Bendavid*, *supra* note 3, at C3.

46. *Kreiling*, *supra* note 37, at 453. A comparison of five different VNTRs can yield a comparison of up to 10 different alleles. *Id.*

47. NRC REPORT, *supra* note 18, at 3-4. The procedure is named after Edwin Southern, who in 1975 developed this method of separating DNA strands through the use of an electrical field. *Id.* at 3. Single-locus RFLP typing on Southern blots is the most common technique considered by courts. *Id.* at 131.

48. *Kreiling*, *supra* note 37, at 451.

49. *Id.* at 451-53. Note that if both the mother and the father possess the same allele at a particular locus, the final image of the two strands will appear as one thick strand instead of two separated, thinner strands. *Thompson & Ford*, *supra* note 38, at 72 n.125.

50. *Kreiling*, *supra* note 37, at 453.

51. *Id.*

52. *Id.*

53. *Id.*

54. *Id.*

the autorads appear to match, the analyst employs optical scanning equipment and a computer to more precisely calculate the length of the two sets of bars.<sup>55</sup> To compare the number of bands contained in each autorad, "laboratory analysts rely on the interpretation of indicators and controls designed to detect problems that could cause the disappearance of true bands or the appearance of spurious extra bands."<sup>56</sup>

The two autorads may differ somewhat but still be declared to match if the variations are thought to fall within an acceptable range.<sup>57</sup> Forensic laboratories have handled these variations through the development of "quantitative matching rules," which dictate how similar the location of the bands must be before they will be declared to match.<sup>58</sup> If the autorad samples fall within this acceptable range, they are declared to match each other.

If the segments match, the analyst must then calculate the odds that such a match is coincidental.<sup>59</sup> Because VNTRs are highly variable in length, there is a low likelihood that two samples from two different sources will yield autorads that are identical in length across several different loci.<sup>60</sup> After the probability of a match at each individual locus is calculated using genetic assumptions,<sup>61</sup> the probability of a match along all loci tested is determined by multiplying these individual probabilities.<sup>62</sup> If the probability calculation shows that the chance of a coincidental match is extremely remote, the analyst will be satisfied that the two samples were obtained from the same person.

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55. *Id.*

56. William C. Thompson, *Evaluating the Admissibility of New Genetic Identification Tests: Lessons from the "DNA War."* 84 J. CRIM. L. & CRIMINOLOGY 22, 41-42 (1993).

57. Kreiling, *supra* note 37, at 453. The analyst, however, plays a large role in determining whether the variations fall within an acceptable range. See *infra* Part III.A for a discussion of interpretive rates of error.

58. Thompson, *supra* note 56, at 40. For example, the Federal Bureau of Investigation declares that two samples match if each of the autorads obtained from the suspect fall within five percent of the autorads obtained from the evidentiary sample. *Id.* at 41. Other laboratories will declare a match only if the variation between the two samples is much smaller. *Id.*

59. Bendavid, *supra* note 3, at C3 ("[If the segments match,] experts must calculate the odds that the match is merely a coincidence, that the DNA at the scene actually belongs to someone else. While everyone's full DNA sequence is different, four segments could conceivably be the same for two or more people.").

60. Thompson, *supra* note 56, at 34-36.

61. One such assumption is that each match between two samples is statistically independent of the others. NRC REPORT, *supra* note 18, at 5. In population genetics, statistical independence is known as "Hardy-Weinberg equilibrium." *Id.* at 4-5. This law assumes the absence of subpopulations—groups of people who share genetic traits and tend to intermarry. *Id.* at 5. See also KIRBY, *supra* note 19, at 168-69 (explaining subpopulation theories and Hardy-Weinberg equilibrium).

62. Kreiling, *supra* note 37, at 455-56.

## II. THE LEGAL MECHANICS OF A NATIONAL DNA DATABASE

## A. Establishing the Statutory Framework

*"Positive identification by DNA profiling is fact. It is not subjective. It is not influenced by the vagaries of human emotion."*<sup>63</sup>

Until recently, prosecutors lacked the ability to compare a suspect's DNA with a sample retrieved from the scene of the crime unless they had first identified the suspect on the basis of other evidence.<sup>64</sup> Now, however, many states are establishing databanks composed of the DNA profiles of potential and convicted criminal offenders.<sup>65</sup> Thus, a former criminal whose DNA matches new forensic evidence can be identified as a suspect on the basis of this match. Moreover, Congress recently enacted the *DNA Identification Act of 1994* (the Act), which authorizes the Federal Bureau of Investigation (FBI) to create a criminal DNA databank.<sup>66</sup> Although the Act grants primary authority to the FBI to create the DNA databank, it also provides funding to state and local governments to set up databanks that can interface with the FBI system.<sup>67</sup> Thus, the Act will standardize DNA analysis and facilitate interstate transfer of a person's DNA profile.<sup>68</sup> The FBI system is called the Combined DNA Identification System (CODIS).<sup>69</sup> According to the Act, CODIS will

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63. GENETIC WITNESS, *supra* note 1, at 3 (quoting William S. Sessions, former Director, Federal Bureau of Investigation).

64. See generally R. Stephen Kramer, *Admissibility of DNA Statistical Data: A Proliferation of Misconception*, 30 CAL. W. L. REV. 145 (1993) (discussing admissibility of DNA against a criminal defendant in several cases).

65. For examples of states that have authorized the creation of a criminal DNA databank, see *supra* note 8.

66. 42 U.S.C. § 14132 (1995).

67. H.R. REP. NO. 393, 104th Cong., 1st Sess. 2 (1995).

68. S. REP. NO. 139, 104th Cong., 1st Sess. 42 (1995). The Senate Report states that: Funding is recommended for grants to States and units of local government to develop or improve forensic DNA testing capabilities in State and local forensic laboratories and to foster cooperation and mutual assistance among forensic DNA laboratories within States and between States that are seeking to match and exchange DNA identification records for law enforcement purposes using the FBI's combined DNA index system (CODIS).

*Id.*

69. H.R. REP. NO. 393 at 2.

include the DNA profiles of convicted criminals, profiles retrieved from crime scenes, and profiles of people whose remains are unidentified.<sup>70</sup>

There are several potential uses of CODIS. First, CODIS can store the DNA profiles of convicted criminals.<sup>71</sup> Second, the DNA of convicted criminals whose profiles are already in the system can be compared with those of unidentified criminals who have left a forensic sample such as semen, blood, or tissue at the scene of the crime.<sup>72</sup> In this way, the databank allows present crimes to be solved based on past criminal activities. Third, repeat offenders can be identified when the same DNA profile is retrieved from more than one crime scene,<sup>73</sup> allowing state and national law enforcement agencies to coordinate their search for the suspect.

Fourth, CODIS could be used to create a national DNA databank. Section 14132(a) permits the Director of the FBI to establish a DNA index.<sup>74</sup> The index includes information from data compiled at the federal, state, and local levels for DNA "identification research."<sup>75</sup> By permitting DNA identification research to be entered into CODIS for later use in identifying otherwise unidentifiable DNA profiles also in the index, the Act could permit the DNA profiling of all citizens. Such action would allow CODIS to be used to identify future victims of crimes and mass disasters, as well as to identify future criminals from the first time they commit a crime. Indeed, the Act currently does not prohibit using CODIS to create a statistical profile that could be used "to predict future criminal behavior by a specific person or groups of persons."<sup>76</sup>

Although Congress only recently enacted the Act, many state laboratories have already joined the FBI in its efforts to integrate DNA databanks nationwide.<sup>77</sup> Although the Act merely implies that the

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70. The Act provides: "The Director of the Federal Bureau of Investigation may establish an index of—

- (1) DNA identification records of persons convicted of crimes;
- (2) analyses of DNA samples recovered from crime scenes; and
- (3) analyses of DNA samples recovered from unidentified human remains."

42 U.S.C. § 14132(a).

71. *Id.* § 14132(a)(1).

72. *Id.* § 14132(b)(3)(A).

73. *Id.* § 14132(a)(2).

74. *Id.* § 14132(a).

75. *Id.* § 14132(b)(3)(D).

76. H.R. REP. NO. 393 at 4. On December 11, 1995, the House passed a bill that would prohibit the use of CODIS for such a purpose. *Id.* To date, however, the Senate has not approved the House proposal.

77. Manning A. Connors, Note, *DNA Databases: The Case for the Combined DNA Index System*, 29 WAKE FOREST L. REV. 889, 890 (1994).

proposed index will be broad enough to allow identification of human remains, two states interpreting this language have already enacted statutes clearly authorizing the use of a DNA databank to identify missing persons or victims of mass disasters.<sup>78</sup> These states' interpretation of the enabling language of the Act reinforces the conclusion that CODIS may be used to create a national DNA databank through which all victims and suspects may be identified. This language, together with the Supreme Court's increased recognition of the states' interest in crime prevention and detection, paves the way for the creation of a national DNA databank.

### *B. Surviving a Fourth Amendment Challenge*

*"If we choose to violate the rights of the innocent in order to discover and act against the guilty, then we will have transformed our country into a police state and abandoned one of the fundamental tenets of our free society."<sup>79</sup>*

In order for the government to establish a national DNA databank under the *DNA Identification Act of 1994*, it would need to obtain samples from every citizen of the United States. Procurement of these samples would implicate the Fourth Amendment, which protects all citizens from unreasonable search and seizure in the absence of probable cause.<sup>80</sup> However, this does not mean that a national DNA databank would not withstand a Fourth Amendment challenge. In the last thirty years, the United States Supreme Court has gradually changed its Fourth Amendment analysis for cases involving searches and seizures. Rather than focusing on the requirement that there be probable cause and procurement of a warrant before a search or seizure occurs, the Court has limited its inquiry in certain cases to whether the search or seizure is reasonable. The Court's current framework weighs the public interest in a certain procedure against the individual interest at stake and typically rules in favor of the public interest. The result is a string of cases that could

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78. See N.C. GEN. STAT. § 15A-266.12(b) (Supp. 1995); TEX. GOV'T CODE ANN. § 411.143 (West Supp. 1996).

79. *Capua v. City of Plainfield*, 643 F. Supp. 1507, 1511 (D.N.J. 1986).

80. The Fourth Amendment provides that:

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.

enable a national DNA databank to withstand a Fourth Amendment challenge.

The Court first considered the constitutionality of bodily intrusions in *Schmerber v. California*, where the petitioner was arrested at a hospital after receiving treatment for injuries sustained in an automobile accident.<sup>81</sup> A police officer requested that the hospital draw a sample of the petitioner's blood in order to determine the blood alcohol content.<sup>82</sup> Although the petitioner did not consent to this test, a blood sample was nevertheless drawn, and the results indicated that he had been intoxicated at the time of the accident.<sup>83</sup>

Although the Court concluded that drawing a blood sample was a search that fell within the purview of the Fourth Amendment,<sup>84</sup> it nevertheless held that the test was reasonable.<sup>85</sup> The Court noted that the proper function of the Fourth Amendment is "to constrain, not against all intrusions as such, but against intrusions which are not justified in the circumstances, or which are made in an improper manner."<sup>86</sup> The Court examined three factors to determine that the bodily intrusion was reasonable within the meaning of the Fourth Amendment.<sup>87</sup> First, the Court noted that the police officer had probable cause to suspect that the petitioner had been intoxicated at the time of the accident.<sup>88</sup> Second, given the speed at which alcohol is metabolized by the body, the case fell within the exigent circumstances exception to the Fourth Amendment's general requirement that a warrant issue before a search is conducted.<sup>89</sup> Third, the Court noted that blood tests are minimally intrusive and do not constitute an unreasonable invasion of a person's privacy interest.<sup>90</sup> The Court balanced the government's interest in determining the petitioner's guilt or innocence against the individual's interest in privacy, and it concluded that the petitioner's Fourth Amendment interest had not been substantially impeded.<sup>91</sup>

After holding that a warrant is not required per se in *Schmerber*, the Court diminished the probable cause requirement the following year in

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81. *Schmerber v. California*, 384 U.S. 757, 758 (1966).

82. *Id.*

83. *Id.* at 759.

84. *Id.* at 767.

85. *Id.* at 771.

86. *Id.* at 768.

87. *Id.* at 768-71.

88. *Id.* at 768-69.

89. *Id.* at 770-71.

90. *Id.* at 771-72.

91. *Id.* at 772.

*Terry v. Ohio*.<sup>92</sup> In *Terry*, the Court upheld the reasonableness of a "stop and frisk" as "a rubric of police conduct."<sup>93</sup> As a later case noted:

*Terry* departed from traditional Fourth Amendment analysis in two respects. First, it defined a special category of Fourth Amendment "seizures" so substantially less intrusive than arrests that the general rule requiring probable cause to make Fourth Amendment "seizures" reasonable could be replaced by a balancing test. Second, the application of this balancing test led the Court to approve this narrowly defined less intrusive seizure on grounds less rigorous than probable cause, but only for the purpose of a pat-down for weapons.<sup>94</sup>

Although the Court emphasized that when "justifying the particular intrusion the police officer must be able to point to specific and articulable facts which, taken together with rational inferences from those facts, reasonably warrant that intrusion," the Court held that the government's interest in crime prevention satisfied this requirement and outweighed the petitioner's individual interest.<sup>95</sup>

The Court also applied its Fourth Amendment balancing test in *New Jersey v. T.L.O.*<sup>96</sup> The search in *T.L.O.*, as in *Terry*, involved a warrantless search.<sup>97</sup> However, unlike *Terry*, the search was performed by a public school vice principal instead of by a police officer.<sup>98</sup> Although the search at issue in *T.L.O.* did not implicate a governmental interest, the Court stated that "the special needs of the school environment require assessment of the legality of such searches against a standard less exacting than that of probable cause."<sup>99</sup> Under this test, the search will be found constitutional if the measures adopted are not excessively intrusive and are

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92. *Terry v. Ohio*, 392 U.S. 1 (1968).

93. *Id.* at 19-20. Although the Court determined that a "stop and frisk" constituted a search and seizure within the meaning of the Fourth Amendment, it held that it was much less invasive than a "technical arrest" or a "full blown search." *Id.* at 19.

94. *Dunaway v. New York*, 442 U.S. 200, 209-10 (1979). The Court in *Dunaway* concluded that the petitioner's Fourth Amendment rights were violated when he was seized by police without probable cause and transported to the station for questioning. *Id.* at 207. The Court held that, although the petitioner technically had not been arrested, the actions taken against him were practically indistinguishable from a traditional arrest, and that probable cause was therefore required. *Id.* at 214-16.

95. *Terry*, 392 U.S. at 21-22.

96. *New Jersey v. T.L.O.*, 469 U.S. 325 (1985).

97. *Id.* at 328.

98. *Id.*

99. *Id.* at 332 n.2.

reasonably related to the objectives of the search.<sup>100</sup> Relying on *Terry*, the Court in *T.L.O.* held that the vice principal was justified in conducting a warrantless search of the respondent because "the measures adopted [were] reasonably related to the objectives of the search and not excessively intrusive."<sup>101</sup>

Similarly, in *National Treasury Employees Union v. Von Raab*, the Court extended the special needs balancing test developed in *T.L.O.* to the mandatory drug testing of all United States Customs Service employees who applied for positions that required them to carry firearms.<sup>102</sup> After noting that it would be impossible to require the government to procure a warrant for every work-related intrusion, the Court then dispensed with the requirement that the government demonstrate probable cause before searching an employee.<sup>103</sup> Because the Court felt that the government's need to conduct suspicionless searches outweighed the employees' privacy interests, it concluded that the search was reasonable under the Fourth Amendment.<sup>104</sup>

In *Skinner v. Railway Labor Executives' Ass'n*, a case decided the same day as *Von Raab*, the Court examined the constitutionality of mandatory blood and urine testing of all railroad employees involved with certain train accidents.<sup>105</sup> Following *Schmerber*, the Court recognized that a "'compelled intrusio[n] into the body for blood' . . . must be deemed a Fourth Amendment search."<sup>106</sup> In deciding the issue of probable cause, the Court remarked that:

[A] showing of individualized suspicion is not a constitutional floor, below which a search must be presumed unreasonable. In limited circumstances, where the privacy interests implicated by the search are minimal, and where an important governmental interest furthered by the intrusion would be placed in jeopardy by a requirement of individualized suspicion, a search may be reasonable despite the absence of such suspicion.<sup>107</sup>

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100. *Id.* at 341-42.

101. *Id.* at 341-42, 348.

102. *National Treasury Employees Union v. Von Raab*, 489 U.S. 656, 664-65 (1989).

103. *Id.* at 666-67 ("Our cases teach, however, that the probable-cause standard is 'peculiarly related to criminal investigations.'") (citations omitted).

104. *Id.* at 672.

105. *Skinner v. Railway Labor Executives' Ass'n*, 489 U.S. 602, 606 (1989).

106. *Id.* at 616 (quoting *Schmerber*, 384 U.S. at 767-68) (alteration in original).

107. *Id.* at 624 (citation omitted).

Thus, although the Court recognized that the mandatory blood and alcohol tests did implicate the Fourth Amendment, it held that the government's interest in public safety overcame any individual privacy interests.<sup>108</sup>

Justices Marshall and Brennan dissented in *Skinner* on the grounds that the search at issue did not fall within the limited scope of *Schmerber*.<sup>109</sup> The dissent remarked that the reason *Schmerber* did not require a warrant prior to the search was due to the exigent circumstances of the case, not because blood tests were commonplace.<sup>110</sup> Unless exigent circumstances were present, the *Schmerber* balancing test was inapplicable.<sup>111</sup> Because no exigent circumstances were involved in the search at issue in *Skinner*, the dissent argued that the government was constitutionally required to make a showing of individualized suspicion.<sup>112</sup> Moreover, because the search at issue did not involve exigent circumstances, the dissent found that the majority's reliance on the special needs test developed in *T.L.O.* was also misplaced.<sup>113</sup> The dissent cautioned:

In the four years since this Court, in *T.L.O.*, first began recognizing "special needs" exceptions to the Fourth Amendment, the clarity of Fourth Amendment doctrine has been badly distorted, as the Court has eclipsed the probable-cause requirement in a patchwork quilt of settings: public school principals' searches of students' belongings; public employers' searches of employees' desks; and probation officers' searches of probationers' homes. Tellingly, each time the Court has found that "special needs" counseled ignoring the literal requirements of the Fourth Amendment for such full-scale searches in favor of a formless and unguided "reasonableness" balancing inquiry, it has concluded that the search in question satisfied that test.<sup>114</sup>

The dissent concluded that both the *Schmerber* and *T.L.O.* balancing tests were inapplicable to the search at issue, and thus, that the government had to demonstrate probable cause under the Fourth Amendment prior to

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108. *Id.* at 633.

109. *Id.* at 645 n.7 (Marshall, J., dissenting).

110. *Id.*

111. *Id.*

112. *Id.* at 645. The dissent continued: "Exactly why a blood test which, if conducted on one person, requires a showing of at least individualized suspicion may, if conducted on many persons, be based on no showing whatsoever, the majority does not—and cannot—explain." *Id.*

113. *Id.* at 639.

114. *Id.* (citations omitted).

mandating blood and alcohol testing of its employees.<sup>115</sup> The majority, however, rejected the dissent's narrow reading of its earlier Fourth Amendment cases and held in favor of the government.

The Court's recent treatment of Fourth Amendment cases demonstrates a subjugation of private interests to governmental or public interests.<sup>116</sup> For example, the Court in *Schmerber* was willing to dispense with the Fourth Amendment's requirement that a warrant be procured prior to a search only because the government had shown the existence of probable cause, exigent circumstances, and the reasonableness of the procedure.<sup>117</sup> By the time it decided *Skinner*, however, the Court indicated that a search would be reasonable under the Fourth Amendment where the governmental interest outweighed an individual's privacy interest.<sup>118</sup> Thus, the constitutionality of a warrantless government search is not necessarily dependent upon a showing of probable cause.<sup>119</sup>

Furthermore, although these cases are factually distinguishable,<sup>120</sup> two common themes develop which are relevant to the constitutionality of a national DNA databank. First, under *Schmerber* and *Skinner*, a blood test is considered a reasonable and minimally invasive procedure.<sup>121</sup> Second, ensuring safety and preventing crime are considered important governmental objectives.<sup>122</sup> To date, where the procedure at issue has

115. *Id.* at 643.

116. See Michael W. Kier, Note, *Jones v. Murray: Allowing the Government to Get Blood From a Stone*, 42 CASE W. RES. L. REV. 635, 639 (1992). Kier notes that:

During the past two decades, the Court has forced the amorphous text of the Fourth Amendment through doctrinal sieves of ever-decreasing diameters. The result is a morass of *ad hoc* exceptions carved from the Fourth Amendment, reducing it to a quivering mass of ineffective safeguards against the state's intrusion on the rights of its citizens.

*Id.*

117. *Schmerber*, 384 U.S. at 768-71.

118. *Skinner*, 489 U.S. at 624.

119. See *id.*

120. Compare *Schmerber*, 384 U.S. 757 (1966) (holding that a blood-alcohol test conducted without a warrant did not violate the Fourth Amendment where the person was arrested on probable cause) and *Terry*, 392 U.S. 1 (1967) (holding that no warrant was required for a routine "stop and frisk" of suspect) and *T.L.O.*, 469 U.S. 325 (1985) (holding that no warrant was required for search of a student's purse due to the special needs of the school environment) and *Von Raab*, 489 U.S. 656 (1989) (holding that no warrant or probable cause was required for drug testing of U.S. Customs Service employees due to government's special needs) and *Skinner*, 489 U.S. 602 (1989) (holding that no warrant or probable cause was required for blood and urine testing of railroad employees involved in train accidents due to government's special interest in ensuring safety).

121. See *Schmerber*, 384 U.S. at 771; *Skinner*, 489 U.S. at 625.

122. See, e.g., *Terry*, 392 U.S. at 22 ("One general [governmental] interest is of course that of effective crime prevention and detection."); *Von Raab*, 489 U.S. at 672 (holding that protection of national borders is a compelling governmental interest); *Skinner*, 489 U.S. at 620 ("The Government's interest in regulating the conduct of railroad employees to ensure safety . . . 'presents special needs

involved mandatory testing to further a governmental interest in ensuring safety, the governmental interest has prevailed.<sup>123</sup>

Against this backdrop, the first step in analyzing the constitutionality of a national DNA databank would be to determine whether the mandatory blood sampling of all American citizens falls within the scope of the Fourth Amendment. Under *Schmerber*, the Court would find that taking a blood sample is a search within the meaning of the Fourth Amendment.<sup>124</sup> Next, the Court would look to see whether the government had demonstrated individualized suspicion prior to requesting the blood sample.<sup>125</sup> In the case of a national DNA databank, individualized suspicion would be impossible to establish at the time the databank were created. Thus, the government would have to argue that the databank was being used to satisfy special governmental needs beyond normal law enforcement procedures. Under *Skinner*, these special needs could justify the departure from the Fourth Amendment's general requirement that probable cause be shown and a warrant obtained prior to intruding upon a private interest.<sup>126</sup>

Under the special needs test, the Court would balance the competing public and private interests.<sup>127</sup> *Terry* made clear that crime prevention and detection are important governmental objectives.<sup>128</sup> In addition, the lack of alternatives for fulfilling the government's objectives is a significant element in the balance.<sup>129</sup> Because DNA analysis is the only process that

beyond normal law enforcement that may justify departures from the usual warrant and probable-cause requirements.") (quoting *Griffin v. Wisconsin*, 483 U.S. 868, 873-74 (1987)). See also *Schall v. Martin*, 467 U.S. 253, 264 (1984) ("The 'legitimate and compelling state interest' in protecting the community from crime cannot be doubted.") (quoting *De Veau v. Braisted*, 363 U.S. 144, 155 (1960)).

123. See, e.g., *Schmerber*, 384 U.S. at 772; *Von Raab*, 489 U.S. at 679; *Skinner*, 489 U.S. at 633.

124. *Schmerber*, 384 U.S. at 768.

125. *Von Raab*, 489 U.S. at 665-66.

126. *Skinner*, 489 U.S. at 619. See also *id.* at 624.

127. *Von Raab*, 489 U.S. at 665-66.

128. *Terry*, 392 U.S. at 22.

129. See *Skinner*, 489 U.S. at 624 ("In limited circumstances, where the privacy interests implicated by the search are minimal, and where an important governmental interest furthered by the intrusion would be placed in jeopardy by a requirement of individualized suspicion, a search may be reasonable despite the absence of such suspicion."); *Von Raab*, 489 U.S. at 665-66:

[O]ur cases establish that where a Fourth Amendment intrusion serves special governmental needs, beyond the normal need for law enforcement, it is necessary to balance the individual's privacy expectations against the Government's interests to determine whether it is impractical to require a warrant or some level of individualized suspicion in the particular context.

allows unique identification of forensic samples,<sup>130</sup> and since the only way for the government to identify the DNA profiles of victims and perpetrators after a crime or disaster has occurred is if their DNA profiles are already on file, no alternatives exist.

If the Court weighed this important governmental interest against personal privacy interests, the governmental interest would probably prevail. Under *Schmerber*, a blood test is a minimally invasive procedure with little risk of trauma, pain, or injury.<sup>131</sup> Further, the procedure would likely be held reasonable because it could be done in conjunction with another procedure to which an individual would have fewer grounds to object.<sup>132</sup> For example, if DNA profiles were obtained at birth and from a sample already drawn for other reasons, the procedure would be less invasive of an individual's privacy interest than if the blood were drawn specifically for the purpose of DNA profiling.<sup>133</sup> Because of its substantial interest in protecting the public and the current lack of alternatives, the government's interest would outweigh an individual's privacy interest in this context, and the implementation of a national DNA databank could be found constitutional under the Fourth Amendment.

### C. Admissibility of a Match

*"Courts must in the end say what is required; there are precautions so imperative that even their universal disregard will not excuse their omission."*<sup>134</sup>

Assuming that a constitutionally valid national DNA databank were created, the DNA profiles that it stored would be of little value unless they could be admitted in court to show that they matched a suspect's DNA profile. Many courts have lowered their standards of admissibility, allowing more scientific evidence into the courtroom.<sup>135</sup> At the same time,

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130. See *supra* Part I for a discussion of DNA as a unique method of identification.

131. *Schmerber*, 384 U.S. at 771.

132. See *T.L.O.*, 469 U.S. at 347-48 (finding that reasonableness of primary search of student's purse for cigarettes formed basis of reasonableness of secondary search for marijuana and evidence of other drug-related activities).

133. One commentator has noted that "[t]he small sample of a newborn's blood from the card taken for the Guthrie test, for example, can . . . yield enough DNA for hundreds of genetic tests." Wilker, *supra* note 14, at 145. Further, genetic testing need not be confined to individuals born after the implementation of a national DNA databank; Wilker notes that DNA can be extracted and profiled from the samples even after years of storage. *Id.*

134. The T.J. Hooper, 60 F.2d 737, 740 (2d Cir. 1932).

135. See *infra* notes 148-165 and accompanying text for a discussion of this more lenient standard of admissibility.

the use of scientific evidence at trial, including the results of DNA profiling, has become increasingly common.<sup>136</sup> This has resulted in a proliferation of DNA evidence in the courtroom.

The first case directly addressing the issue of admissibility of scientific evidence was *Frye v. United States*.<sup>137</sup> In *Frye*, the defendant appealed his murder conviction and asserted that the district court had erred in refusing to admit the results of a lie detector test that tended to prove his innocence.<sup>138</sup> The court of appeals rejected his claim, stating that "while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs."<sup>139</sup> The court concluded that, since lie detector tests had not gained general acceptance by physiologists and psychologists in the scientific community, the results of the defendant's tests were inadmissible.<sup>140</sup>

Although *Frye* was only a circuit court decision, the general acceptance test became the prevailing standard for determining the admissibility of scientific evidence.<sup>141</sup> However, when Congress enacted the Federal Rules of Evidence (the Rules) in 1975, the law of evidence apparently changed,<sup>142</sup> and the future of the *Frye* standard became less clear. In promulgating the Rules, Congress made no mention of either *Frye* or the general acceptance test.<sup>143</sup> Moreover, Rule 702 allows scientific evidence to be admitted as long as it will assist the trier of fact.<sup>144</sup> Thus, Rule 702 emphasizes evidentiary relevance over scientific

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136. Edward J. Imwinkelried, *The Debate in the DNA Cases over the Foundation for the Admission of Scientific Evidence: The Importance of Human Error as a Cause of Forensic Misanalysis*, 69 WASH. U. L.Q. 19, 22 (1991). This increase in the use of scientific evidence in the courtroom is directly attributable to the lower standard of admissibility. *Id.*

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

138. *Id.* at 1013. The procedure at issue was actually a systolic blood pressure deception test, *id.*, "a crude precursor to the polygraph machine." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786, 2793 (1993).

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

140. *Id.*

141. *Daubert*, 113 S. Ct. at 2792.

142. CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, EVIDENCE UNDER THE RULES xxix (1993).

143. *Daubert*, 113 S. Ct. at 2794.

144. Rule 702 provides that "[i]f 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." FED. R. EVID. 702.

acceptance and places the determination of admissibility in the hands of the trial court judge instead of the scientific community.

For almost twenty years, lower federal courts and state courts struggled to interpret *Frye* in light of the Rules.<sup>145</sup> While some courts decided that *Frye* and the Rules could be reconciled, others held that *Frye* had been superseded by the Rules.<sup>146</sup> Still other courts enacted their own standards of admissibility.<sup>147</sup> Due to this confusion and lack of uniformity in the lower courts, the Supreme Court stepped in to resolve the issue in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*<sup>148</sup>

The Court in *Daubert* held that *Frye*'s rigid general acceptance test was at odds with the more "liberal thrust" of the Rules, which relaxed the traditional hurdles to admitting expert opinion testimony.<sup>149</sup> The Court determined that as long as the proffered evidence was both reliable and relevant, it was admissible under the Rules.<sup>150</sup> To qualify as "scientific

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145. Although the Rules are not binding on state courts, state codes of evidence based on these rules have been adopted in more than thirty states. See MUELLER & KIRKPATRICK, *supra* note 142, at xxix.

146. Compare *Christopherson v. Allied-Signal Corp.*, 939 F.2d 1106, 1111, 1115-16 (5th Cir. 1991), *cert. denied*, 112 S. Ct. 1280 (1992) (holding that *Frye* and the Rules coexist) with *United States v. Williams*, 583 F.2d 1194, 1197-1200 (2d Cir. 1978), *cert. denied*, 439 U.S. 1117 (1979) (applying the "assist trier of fact" test under Rule 702, instead of the more stringent *Frye* general acceptance test).

147. The California Supreme Court, for example, modified *Frye* in *People v. Kelly*. *People v. Kelly*, 549 P.2d 1240 (Cal. 1976). In *Kelly*, the court held that, in order to show that a technique is generally accepted under *Frye*, a proponent of a scientific technique must establish that the technique is reliable and that the witness testifying as to its reliability is qualified as an expert. *Id.* at 1244. Another example is illustrated by *United States v. Jakobetz*. *United States v. Jakobetz*, 747 F. Supp. 250 (D. Vt. 1990). In *Jakobetz*, the district court set forth factors to consider in determining the admissibility of scientific evidence. These factors include:

(1) the potential rate of error; (2) the existence and maintenance of standards; (3) the care with which the scientific technique has been employed and whether it is susceptible to abuse; (4) whether there are analogous relationships with other types of scientific techniques that are routinely admitted into evidence; (5) the presence of failsafe characteristics; . . . [6] the expert's qualifications and stature; [7] the existence of specialized literature; [8] the novelty of the technique and its relationship to more established areas of scientific analysis; [9] whether the technique has been generally accepted by experts in the field; [10] the nature and breadth of the inference adduced; [11] the clarity with which the technique may be explained; [12] the extent to which basic data may be verified by court and jury; [13] the availability of other experts to evaluate the technique; and [14] the probative significance of the evidence.

*Id.* at 254-55 (footnote omitted).

148. *Daubert*, 113 S. Ct. at 2786.

149. *Id.* at 2794.

150. *Id.* at 2795. Although the Court noted two checks on the admissibility of expert testimony under the Rules, these checks are unlikely to keep most scientific evidence out of the courtroom. First, while juries are generally competent to evaluate most expert testimony, the Court determined that, in the case of scientific evidence, trial court judges were responsible for screening unreliable

knowledge" under Rule 702, "an inference or assertion must be derived by the scientific method . . . [and p]roposed testimony must be supported by appropriate validation"<sup>151</sup> so that "[i]n a case involving scientific evidence, *evidentiary reliability* will be based upon *scientific validity*."<sup>152</sup> To determine when scientific testimony is admissible under Rule 702, a court may consider and balance several different criteria.<sup>153</sup> One criterion is whether the theory or technique can be and has been tested.<sup>154</sup> A second criterion is whether the technique has been subjected to peer review and publication; however, the Court noted that, in some instances, a technique which has not been subjected to peer review may nevertheless be found reliable.<sup>155</sup> A third criterion is whether the rate of error or potential for error is known.<sup>156</sup> A fourth criterion is whether the technique or theory is generally accepted under *Frye*.<sup>157</sup> The Court emphasized that the Rule 702 inquiry is a flexible one and that evidence does not have to satisfy a "definitive checklist" to be admitted.<sup>158</sup> Moreover, the Court noted that, in determining whether scientific evidence is admissible, a court should focus on the principles of the methodology used instead of the conclusions drawn.<sup>159</sup>

As a result of *Daubert*, it is now easier to admit evidence linking a suspect's DNA to samples found at the scene of a crime. First, DNA profiling procedures are capable of being tested and have been tested, although primarily in a non-blind setting.<sup>160</sup> Second, the process has been subjected to peer review and publication, and both the Office of

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expert testimony under Rule 104(a). *Id.* at 2796. As one recent commentator noted, "*Daubert* does not, however, discuss the circumstances that will trigger in limine judicial screening pursuant to Rule 104(a), or the nature of an in limine hearing[, and] . . . courts are unlikely to undertake the inquiry envisioned by *Daubert* whenever scientific evidence is proffered." Margaret A. Berger, *Evidentiary Framework*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 37, 50 (Fed. Jud. Ctr. 1994). Second, the Court noted that relevant expert testimony may be excluded under Rule 403 in some cases. *Daubert*, 113 S. Ct. at 2798. However, the Court did not provide guidelines to determine when courts should exclude expert testimony pursuant to Rule 403, and courts have disagreed on its interpretation. Berger, *supra*, at 43-45.

151. *Daubert*, 113 S. Ct. at 2795.

152. *Id.* at 2795 n.9 (emphasis added).

153. *Id.* at 2796.

154. *Id.*

155. *Id.* at 2797.

156. *Id.*

157. *Id.* at 2796-97.

158. *Id.* See also Randolph N. Jonakait, *The Meaning of Daubert and What That Means for Forensic Science*, 15 CARDOZO L. REV. 2103, 2104 (1994) ("Although *Daubert* suggested that trial courts examine four factors, it was only a suggestion.").

159. *Daubert*, 113 S. Ct. at 2797.

160. See *infra* notes 202-10 and accompanying text.

Technology Assessment and the National Research Council (NRC) have endorsed the general reliability of RFLP profiling.<sup>161</sup> Third, most courts have held that questions concerning the rate of error go to the weight, instead of the admissibility, of the evidence.<sup>162</sup> Fourth, as more courts admit evidence of DNA profiling procedures, the practice is more likely to be held generally accepted under *Frye*.<sup>163</sup> Although *Daubert* is only binding on federal courts, it carries significant weight with state courts, especially those states that have adopted the Rules in their state evidence codes.<sup>164</sup> Consequently, regardless of where a suit is filed, the results of a DNA profiling match are likely to be admitted as evidence against a defendant.<sup>165</sup>

### III. POLICY CONSIDERATIONS OF A NATIONAL DNA DATABANK

Even if the creation of a national DNA databank could withstand constitutional and evidentiary hurdles, it should nevertheless be prohibited given the current testing procedures and the legal context in which DNA evidence is introduced. First, DNA profiling procedures are subject to multiple sources of error which distort the likelihood that two samples will be declared to match.<sup>166</sup> Second, lack of industry and laboratory standards renders detection of any errors practically impossible.<sup>167</sup> Third, studies show that once scientific testimony is received in the courtroom, jurors are incapable of assigning the proper weight to forensic evidence.<sup>168</sup> Together, these factors suggest that it would be very difficult for a suspect identified

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161. Kramer, *supra* note 64, at 161.

162. See, e.g., *State v. Anderson*, 881 P.2d 29, 43 (N.M. 1994). See also Thompson, *supra* note 56, at 45 ("In the majority of cases, courts have held that disputes over the matching procedure raise issues going to the weight, rather than the admissibility, of the DNA evidence.").

163. As one commentator has remarked:

[T]here is little agreement among commentators regarding whether the *Daubert* standard is more liberal (i.e., allows more science in the courtroom) or more conservative (i.e., allows less) than the general acceptance standard of *Frye*. . . . [I]t appears that [the] standard is more conservative when applied to scientific fields with a tradition of rigorous testing and more liberal when applied to scientific fields that lack such a tradition.

David L. Faigman, *The Admissibility of DNA Profiling Under California Law*, 1994 WL 514863, at \*2 (Sept. 22, 1994).

164. Thompson, *supra* note 56, at 32.

165. Imwinkelried, *supra* note 136, at 20 ("The overwhelming majority of courts that have passed on DNA typing have held the evidence admissible.").

166. See *infra* Part III.A.

167. See *infra* Part III.B.

168. See *infra* Part III.C.

through a national DNA databank to refute evidence of a match.<sup>169</sup> Because suspects would be initially identified through a databank<sup>170</sup> which could itself contain erroneous test results, the risk of false conviction is too great to support the creation of a national DNA databank for criminal prosecution.

#### A. Sources of Error

*"The right to search for truth implies also a duty; one must not conceal any part of what one has recognized to be true."<sup>171</sup>*

No one questions the theory underlying DNA analytical procedures.<sup>172</sup> However, a legally reliable scientific procedure is not one that works well only in theory; it is one that works well in practice.<sup>173</sup> Accordingly, most criticism of DNA evidence has centered on the reliability, adequacy, and accuracy of current laboratory practices.<sup>174</sup>

RFLP analysis for use in criminal identification may be subject to various sources of error, including inherent error, testing error, laboratory procedure error, and interpretive error. Inherent errors result from the unique nature of criminal investigations. Samples obtained from crime

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169. It is important to note that evidence may be excluded under Rule 403 if it is found to be too prejudicial or misleading to a jury. FED. R. EVID. 403. However, recent court decisions indicate that questions as to the reliability of DNA evidence admitted against a defendant go to the weight, rather than the admissibility, of the evidence. See *supra* note 165.

170. Although a suspect would be initially identified through the national DNA databank, states would probably obtain an additional sample from a suspect to corroborate their original suspicions. Telephone Interview with Kenneth R. Kreiling, Professor, Vermont Law School (July 11, 1995). However, acquisition of the additional sample may generate further problems. First, requiring a person to provide a blood sample for the sole purpose of obtaining his or her DNA profile would create a privacy issue under the Fourth Amendment. *Id.* Second, samples that did not quite match could be the result of either two separate sources or faulty testing techniques. See *infra* Part III.A. However, the prosecution would likely seek to introduce both samples into evidence and explain the apparent inconsistency to the jury. This, however, would compound the likelihood of juror misinterpretation of the evidence. See *infra* Part III.C.

171. GENETIC WITNESS, *supra* note 1, at 57 (quoting Albert Einstein).

172. Thompson, *supra* note 56, at 27. See also NRC REPORT, *supra* note 18, at 15-16 ("DNA typing is capable, in principle, of an extremely low inherent rate of false results . . .").

173. Jonakait, *supra* note 158, at 2115.

174. Thompson, *supra* note 56, at 27-28. Thompson explains:

The three major issues that have consistently been raised are: (1) the adequacy of standards and controls for assuring the reliability of the forensic tests, (2) the adequacy of the procedures used by forensic laboratories to determine whether DNA profiles "match," and (3) the accuracy of the procedures used to determine the statistical frequency or rarity of DNA profiles.

*Id.*

scenes are frequently degraded, contaminated, or composed of DNA from more than one individual.<sup>175</sup> Moreover, the evidence obtained from the crime scenes often yields such small amounts of DNA that it is possible to analyze the sample only once.<sup>176</sup> When this occurs, it is harder to determine the accuracy of the profile obtained, and any errors in the profiling process are more likely to go undetected. In addition, technical problems may cause the autorads to be obscured, faint, or blurry, and spurious dark spots on the prints may appear and be mistaken for bands by the analyst.<sup>177</sup>

Other errors may be caused by testing inaccuracies. For example, band shifting—the anomalous migration of DNA during the profiling process—occurs when the methodology used is faulty or when the salt concentration in the gel is too high.<sup>178</sup> Band shifting also occurs when different amounts of DNA from each sample are placed in the gel.<sup>179</sup> Band shifting may cause two DNA samples from the same person to appear different, or it may cause two samples from two different people to appear the same.<sup>180</sup>

Although testing errors will occur, even when precautions are taken,<sup>181</sup> faulty laboratory procedure may be the primary cause of misanalysis.<sup>182</sup> As in any forensic work, analysts may fail to properly preserve and label each sample or to record the chain of custody.<sup>183</sup> Unless safeguards are implemented to address these possible sources of error and analysts actively work to prevent their occurrence, these mistakes may go undetected.

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175. *Id.* at 36. See also *id.* at 42 (“Interpretation of forensic DNA tests often requires analysts to distinguish the extra bands or alleles that indicate a mixed sample from extra bands and alleles that result from laboratory artifacts or accidental cross-contamination.”).

176. NRC REPORT, *supra* note 18, at 6.

177. Thompson, *supra* note 56, at 38.

178. Michael J. Short, Note, *Forensic DNA Analysis: An Examination of Common Objections Raised to the Admission of DNA Fingerprinting as Illustrated by State v. Pierce*, 19 U. DAYTON L. REV. 133, 153 (1993). Differences in salt concentrations between two samples can cause differential migration of the samples in the gel. *Id.* Fortunately, this problem may be corrected if detected by the analyst. In a process known as dialysis, the DNA samples are placed on a membrane that contains pores small enough to trap the DNA but large enough to permit liquid to flow through it. *Id.* at 153 n.199. The membrane is then placed in a solution containing a lower concentration of salt. *Id.* This solution draws the salt from the DNA samples and thus lowers their salt concentration. *Id.*

179. GENETIC WITNESS, *supra* note 1, at 65. If too much DNA is placed in the gel, it cannot migrate through the gel properly, and the profile that results will be inaccurate. *Id.*

180. NRC REPORT, *supra* note 18, at 60.

181. *Id.* at 89.

182. Imwinkelried, *supra* note 136, at 47.

183. NRC REPORT, *supra* note 18, at 131.

Probably the most damaging source of error occurs during the interpretation of the test results.<sup>184</sup> Technicians can substitute their own judgment for the results obtained from optical scanning equipment and computer assistance programs, potentially converting exculpatory results into incriminating ones, and vice versa.<sup>185</sup> When the analyst does not adhere to these objective sources, the determination of a match is then primarily based upon the subjective judgment of the laboratory analyst.<sup>186</sup> This subjective judgment is particularly troublesome because the scoring of a few ambiguous bands may determine whether or not a suspect is exculpated.<sup>187</sup>

A study published in 1993 highlights two additional sources of interpretive error that may be especially problematic for DNA analysis.<sup>188</sup> This study tested laboratory proficiency in identifying and comparing different samples typically obtained from a crime scene.<sup>189</sup> First, the report noted that, when the samples had been derived from body fluids, such as semen or saliva, or from a mixture of blood and other body fluids, the laboratories experienced significant difficulty in determining whether the samples were obtained from the same person.<sup>190</sup> Second, the report found that when the laboratories erred, they were far more likely to conclude that two samples matched when in fact they did not, than they

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184. See Inwinkelried, *supra* note 136, at 45 ("As powerful as a scientific technique such as . . . DNA [profiling] may be, in the forensic world the technique must be applied by a fallible human being.").

185. Thompson, *supra* note 56, at 40. Thompson adds that records of manual overrides are sketchy at best; thus, it is practically impossible to determine how significant an analyst's subjective judgment is in any particular case. *Id.* at 40 n.80.

186. J. Clay Smith, Jr., *The Precarious Implications of DNA Profiling*, 55 U. PITT. L. REV. 865, 871 (1994) (citing Janet C. Hoefel, Note, *The Dark Side of DNA Profiling: Unreliable Scientific Evidence Meets the Criminal Defendant*, 42 STAN. L. REV. 465, 474 (1990)).

187. Thompson, *supra* note 56, at 37.

188. Joseph L. Peterson, *An Update on Crime Laboratory Proficiency Test Results: Scientific and Legal Concerns*, in PROCEEDINGS OF THE SECOND INT'L CONFERENCE ON FORENSIC STATISTICS C-3 (W. Harnagel & D. H. Kaye eds., 1993). Although this study did not involve DNA profiling procedures, *id.* at C-6, the discussion of analyst interpretation of results is relevant to the present discussion of analyst interpretation of DNA profiles.

189. These materials included blood and body fluids, drugs, fingerprints and palmprints, firearms, paint, and toolmarks. *Id.* at C-3.

190. *Id.* at C-9. The report states that while fingerprint and palmprint comparisons had a 98% success rate and bloodstain comparisons had a 91% success rate, body fluid comparisons and mixed blood and body fluid comparisons had a success rate of only 83%. *Id.* The result may be significant in the context of DNA profiling procedures, where one forensic sample may contain the DNA of both the perpetrator and the victim.

were to conclude that two samples did not match when in fact they did.<sup>191</sup> Due to this tendency to misanalyze mixed body fluids, the report concluded that substantial improvement was necessary in this area of forensic analysis.<sup>192</sup> Because most forensic samples contain DNA from more than one individual, the results of the study suggest that DNA analysts may experience a similar tendency to misanalyze samples and declare that two samples match when they were actually obtained from different people. The variety of types and sources of error in DNA profiling procedures indicates that a person identified as a suspect through a national DNA databank could in fact be innocent.

### B. Lack of Standardization and Regulation

*"By nature, nothing is routine in forensic casework."*<sup>193</sup>

Given the errors that may occur during the DNA profiling process and the potential for misanalysis, standardized test procedures would allow laboratories to monitor their results internally, as well as provide a ready means by which a laboratory's proficiency could be regulated externally. However, the need to both regulate and standardize DNA profiling procedures has only recently been recognized and encouraged.<sup>194</sup> The lack of standardization and quality assurance in DNA profiling methods is due largely to the rapid emergence of DNA profiling by private laboratories in the mid-1980s.<sup>195</sup> Some observers suggest that the private laboratories initially engaged in a "race to the courthouse," each laboratory hoping to acquire a competitive advantage over the others by establishing the admissibility of its DNA profiling procedures as quickly as possible.<sup>196</sup>

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191. *Id.* at C-12. The total errors of improper inclusion (deciding that two samples from different sources matched) were twice as high as the total errors of improper exclusion (deciding that two samples from the same source did not match). *Id.* This tendency to over-include was even more pronounced in blood sample comparisons: the results indicated that improper inclusions occurred more than three times as frequently as improper exclusions. *Id.* In the context of DNA profiling procedures, this tendency may be especially problematic because DNA is often retrieved from body fluids and blood.

192. *Id.* at C-13.

193. GENETIC WITNESS, *supra* note 1, at 83.

194. *Id.* at 82. See also NRC REPORT, *supra* note 18, at 97-98 ("It is not uncommon for an emerging technology to go without regulation until its importance and applicability are established. Indeed, the development of DNA typing technology has occurred without regulation of laboratories and their practices, public or private.").

195. NRC REPORT, *supra* note 18, at 15.

196. Thompson, *supra* note 56, at 36 (citing Peter Neufeld & Neville Colman, *When Science Takes the Witness Stand*, 262 SCI. AM. 46 (1990)).

Instead of subjecting their procedures to scrutiny by the scientific community, these private industries claimed that their procedures constituted trade secrets and were thus obtainable only by court order.<sup>197</sup> During these early years, most courts admitted DNA evidence based on assertions by the interested laboratories that their procedures were both reliable and generally accepted by the scientific community.<sup>198</sup>

In an attempt to establish a competitive edge over other laboratories, each laboratory selected a different method of analyzing the VNTR loci.<sup>199</sup> One way laboratories distinguished themselves from each other was to select different VNTR loci for analysis.<sup>200</sup> Another way was to use different reagents and materials in the DNA profiling procedures.<sup>201</sup> Thus, these DNA profiles cannot be compared to one another.

In addition, individual laboratories have never been properly examined, through proficiency testing, to determine the accuracy of their DNA profiling results. To date, proficiency testing has not been addressed systematically,<sup>202</sup> and the results that have been obtained thus far are not particularly helpful for several reasons. First, in most cases, the laboratories knew that they were being tested,<sup>203</sup> and thus the technicians were likely to be more conscientious in both their profiling procedures and analyses. Second, the samples used in the proficiency tests were not representative of samples generally obtained from a crime scene: instead of using small, degraded, or contaminated samples, the laboratories received large samples that had been carefully preserved on a clean cloth.<sup>204</sup> Third, the laboratories were frequently told what types of evidentiary material the samples contained, rather than making this

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197. Thompson & Ford, *supra* note 38, at 59. Consequently, any criticisms of the procedures used by a particular laboratory were confined to the court hearing. *Id.* The laboratories' claim that their procedures constituted trade secrets lost credibility, however, when commentators pointed out the fundamental incompatibility between this claim and the claim that the procedures were generally accepted. *Id.* at 60. See *supra* notes 137-48 and accompanying text for further discussion of the *Frye* general acceptance standard of admissibility.

198. Kreiling, *supra* note 37, at 457.

199. Recall that, while most genetic information is common to all individuals, the VNTR loci vary widely from person to person and thus are of most interest to a DNA analyst. See *supra* Part I for a discussion of VNTR analysis.

200. Kreiling, *supra* note 37, at 454.

201. Thompson, *supra* note 56, at 36 n.68.

202. Kreiling, *supra* note 37, at 462.

203. Jonathan J. Koehler, *Error and Exaggeration in the Presentation of DNA Evidence at Trial*, 34 JURIMETRICS J. 21, 24 (1993).

204. *Id.* at 24-25.

determination themselves.<sup>205</sup> Finally, most laboratories that participated in the proficiency tests have not disclosed the results,<sup>206</sup> or have been willing to participate in a study only on the condition of anonymity,<sup>207</sup> so it is practically impossible to determine the proficiency level of any particular laboratory.

Since 1985, The American Society of Crime Laboratory Directors—Laboratory Accreditation Board (ASCLD—LAB) has operated a voluntary accreditation program for laboratories performing DNA analysis.<sup>208</sup> This program consists of self-evaluation, inspection, and proficiency testing.<sup>209</sup> However, the ASCLD—LAB program remains voluntary, and certification is not universal.<sup>210</sup>

In its 1992 report, the NRC embraced the principles behind DNA profiling but strongly advocated the adoption of a comprehensive quality assurance program.<sup>211</sup> In particular, the NRC Report recommended that DNA profiling laboratories adhere to guidelines developed by the Technical Working Group on DNA Analysis Methods (TWGDAM) for quality assurance and proficiency testing.<sup>212</sup> Potential quality assurance mechanisms include both internal and external testing procedures such as formal programs, individual analyst certification, laboratory certification, and compliance with state or federal regulation.<sup>213</sup> TWGDAM's proficiency testing mechanisms also combine internal and external controls and include guidelines for sample documentation, testing procedures, and reporting of proficiency results.<sup>214</sup> The NRC Report noted, however, that

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205. *Id.* at 25. The evidentiary materials included samples such as blood, semen, or hair, or a combination of blood and semen. *Id.* at 24, 25 nn.15-16.

206. Kreiling, *supra* note 37, at 462, 466.

207. *See, e.g.*, Peterson, *supra* note 188, at C-3.

208. NRC REPORT, *supra* note 18, at 102.

209. Short, *supra* note 178, at 149 n.165.

210. Connors, *supra* note 77, at 913.

211. NRC REPORT, *supra* note 18, at 98. The NRC Report defines quality assurance as "a documented system of activities or processes for the effective monitoring and verification of the quality of a work product (in this case, laboratory results)." *Id.*

212. *Id.* at 99. The NRC Report describes TWGDAM as, a practitioners' group that comprises over 30 scientists who work in DNA typing in 24 state, local, and federal forensic laboratories in the United States and Canada. Its purpose is to assemble forensic scientists actively involved with DNA typing methods and have them discuss the methods being used, compare work and results, and share protocols.

*Id.* at 98. The NRC Report further states that, although the FBI initially played a substantial role in TWGDAM's operation and activities, TWGDAM's guidelines should be expanded to cover the entire range of forensic laboratories. *Id.* at 99.

213. *Id.* at 16.

214. *Id.* at 99.

TWGDAM guidelines were voluntary, and it recommended that formal procedures, including supervision by ASCI.D—LAB, be adopted.<sup>215</sup>

In response to the NRC's recommendation that formal procedures be adopted, Congress authorized the director of the FBI to appoint an advisory board to develop standards for quality assurance in DNA testing procedures and recommend them to the director of the FBI.<sup>216</sup> Until the FBI receives and adopts the recommended quality assurance guidelines from the advisory board, it will continue to adhere to the standards established by TWGDAM.<sup>217</sup> Further, the *DNA Identification Act of 1994* authorizes the director of the National Institute of Justice to determine whether or not blind external proficiency tests are a feasible method of testing the proficiency of all public and private laboratories conducting DNA forensic analyses.<sup>218</sup> However, even if the advisory board determines that blind external proficiency testing is feasible, participation by state and local DNA laboratories in such testing procedures will still be voluntary.<sup>219</sup>

Although voluntary accreditation programs are better than no accreditation programs at all, laboratories need not undergo accreditation as a prerequisite to admitting their analytical results in court.<sup>220</sup> Yet, in the absence of blind external proficiency testing results, it is impossible for jurors to appreciate a laboratory's conclusion, and hence, how much weight ought to be assigned to the determination of a match. Although critics of mandatory accreditation argue that "a match is a match" and that

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215. *Id.* at 106.

216. 42 U.S.C. § 14131(a) (1995).

217. *Id.* § 14131(a)(4).

218. *Id.* § 14131(c)(1). This section defines "blind external proficiency test" as "a test that is presented to a forensic laboratory through a second agency and appears to the analysts to involve routine evidence." *Id.* § 14131(c)(2). Currently, most DNA laboratories do not undergo blind external proficiency testing. See *supra* notes 202-07 for a discussion of present testing practices.

219. H.R. CONF. REP. NO. 711, 103d Cong., 2d Sess. 397 (1994), reprinted in 1994 U.S.C.C.A.N. 1801, 1864-65. The legislative history to the Act states that:

If the NIJ [National Institute of Justice] study determines blind external proficiency testing is feasible, neither State nor local DNA laboratories covered by the Act (i.e., those participating in the national DNA index or receiving grants), will be required by the Act to subscribe to such a blind testing program. . . . Participation by State and local governments should be voluntary and at their own discretion . . . .

*Id.* at 1865. The Act only requires the FBI's DNA testing laboratory to undergo periodic blind external proficiency testing. 42 U.S.C. § 14133(a).

220. However, the legislative history to the *DNA Identification Act of 1994* states that "participation in such a program will be an important element of demonstrating quality control for purposes of having DNA evidence introduced into evidence." H.R. REP. NO. 711 at 397; 1994 U.S.C.C.A.N. 1801 at 1865.

validation of testing procedures is unnecessary, reports of false matches indicate that mandatory testing procedures are imperative.<sup>221</sup>

### C. Jury (Mis)interpretation of the Evidence

"I've never seen a jury so alert—not understanding, but alert ...."<sup>222</sup>

In holding that questions about the reliability of scientific testimony go to the weight rather than the admissibility of the evidence,<sup>223</sup> the Supreme Court has essentially left to juries the responsibility of determining whether questionable evidence should be used against a defendant, and if so, how much weight this evidence should be given. A study by William Thompson, however, indicates that it is not at all clear that juries are equipped to perform this complex task.<sup>224</sup>

In assessing evidence of a DNA profile match, Thompson notes that jurors have a number of responsibilities. Initially, jurors should appreciate the possibility that a match is coincidental.<sup>225</sup> Next, Thompson cautions that jurors should be careful not to overvalue the probability that someone other than the defendant could match the forensic sample.<sup>226</sup> For example, jurors should understand that the probability of a match is calculated by

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221. See Thompson, *supra* note 56, at 57. Additionally, in an article written jointly by a proponent and former opponent of DNA admissibility, the authors remarked that, "there is no evidence that . . . technical failings [in laboratory practices] resulted in any wrongful convictions . . ." Eric S. Lander & Bruce Budowle, *DNA Fingerprinting Dispute Laid to Rest*, 371 NATURE 735, 735 (Oct. 27, 1994). This comment is puzzling in light of the recent formation of the Innocence Project at Yeshiva University's Cardozo School of Law, an organization whose purpose is to clear people who were convicted before DNA testing was available, or when DNA profiling procedures yielded an erroneous test result. See Span, *supra* note 5, at C1. The need for forming such an organization indicates that wrongful convictions have indeed occurred as a result of technical failings in DNA profiling procedures.

222. Bendavid, *supra* note 3, at C3 (statement by James E. Starrs, a George Washington University law professor who has participated in many trials involving DNA evidence). Starrs continued, "I don't know of any other instance in forensics where the jury is just overwhelmed with a visual and pictorial presentation." *Id.*

223. See *supra* notes 145-65 and accompanying text.

224. William C. Thompson, *Are Juries Competent to Evaluate Statistical Evidence?*, 52 LAW & CONTEMP. PROBS. 9, 22 (1989).

225. *Id.* at 19.

226. Recall that, because each person's genetic makeup consists of billions of units, it is impossible to test two samples for a match at every locus. See *supra* note 45 and accompanying text. Thus, the analyst typically selects between three and five VNTR loci for purposes of comparison. See *supra* note 46 and accompanying text. If a match is detected along at least some of the loci, the analyst multiplies the individual probabilities of a match at each locus together to derive the probability that someone other than the defendant would match the sample. See *supra* notes 59-62 and accompanying text for further discussion of this issue.

multiplying the individual probabilities of a match at each locus together.<sup>227</sup> Moreover, Thompson emphasizes that jurors should realize that a probability estimate only reflects the probability that someone other than the defendant could match the sample obtained from the scene of the crime.<sup>228</sup> This probability estimate is not the same, nor as probative, as the probability that the defendant is guilty.<sup>229</sup>

Jurors also need to assign proper weight to the laboratory findings themselves. Results from laboratories that have not undergone blind external proficiency testing are less reliable than those that have undergone such testing, and hence, they should receive less weight.<sup>230</sup> If the laboratory has undergone such testing, the jurors need to assess the reliability of the laboratory's findings by considering the laboratory's false-positive rate of error.<sup>231</sup> A false-positive rate of error is the rate at which two samples that do not match are misclassified and declared to match.<sup>232</sup> Unless jurors realize that there is a chance that two samples that are declared to match were in fact obtained from different sources, they may overestimate the value of a declared match. Moreover, even if jurors take the false-positive rate of error into account, they must also be aware of how this rate of error was obtained. Currently, many laboratory proficiency tests report rates of error that are averaged from each participating laboratory's individual rate of error; the individual laboratory rates of error may thus be higher or lower than the average rate.<sup>233</sup>

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227. This practice is often referred to as the "product rule." Use of the product rule assumes that a finding of a match at one VNTR locus is statistically independent from finding a match at other VNTR loci. This practice, however, has been widely criticized, as it ignores the potential existence of groups of people who tend to share many of the same characteristics. See generally NRC REPORT, *supra* note 18, at 9-14 (discussing the potential existence of population substructure).

228. Thompson, *supra* note 224, at 20.

229. Berger explains the source of confusion as follows:

The so-called "prosecutor's fallacy" occurs when a prosecutor presents statistical evidence to suggest that the evidence indicates the likelihood of the defendant's guilt rather than the odds of the evidence having been found in a randomly selected sample. The danger that jurors will erroneously confuse the probability of a match with the probability of guilt exists whenever a test can reliably match two samples and the resulting match is being used to identify the defendant.

Berger, *supra* note 150, at 97. The danger undoubtedly increases when a "match," based on unreliable testing methods, is offered by the prosecution in an attempt to link the defendant to the crime.

230. See *supra* Part III.B for a discussion of the need for blind external proficiency testing of laboratories performing DNA analyses.

231. Thompson, *supra* note 224, at 23.

232. *Id.*

233. See, e.g., Peterson, *supra* note 188, C-3 *passim*.

Thompson contends that, when confronted with complex and conflicting evidence, jurors tend to overestimate the value of the evidence in several different ways. For example, in cases where the scientific evidence partly overlaps and recapitulates facts that have already been presented, most jurors do not realize that this partially redundant evidence deserves less weight than evidence that does not overlap with other facts asserted.<sup>234</sup> Additionally, jurors may give equal weight to statistical evidence that varies widely in its probative value, thereby significantly overestimating in some circumstances the value of probability estimates of a match.<sup>235</sup> Finally, when confronted with this complex and uncertain evidence, many jurors may proceed according to what experts have called the "best guess" strategy.<sup>236</sup> Thompson describes this theory as follows:

To reduce the complexity of the judgment, people make their best guess as to whether the evidence is reliable and, if they think it is probably reliable, they proceed to evaluate the evidence as if it were perfectly reliable. They then discount their certainty about their conclusions to take into account their uncertainty about the reliability of the evidence. They often fail to discount this evidence adequately, however. The result is that judgments based on less than fully reliable evidence are often unduly extreme . . . .<sup>237</sup>

The "best guess" strategy leads jurors to overestimate the value of uncertain evidence yet again.

Not surprisingly, in interpreting evidence, most jurors fail to give proper weight to each of the factors influencing the reliability of the evidence. As Thompson noted, "lay jurors are overawed by science and lack the capacity to evaluate it critically, [and thus,] unreliable scientific testimony is likely to be given more weight than it deserves."<sup>238</sup> Courts, too, have remarked on the overwhelming effect of scientific testimony on

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234. Thompson, *supra* note 224, at 38-40 (citing W. Thompson, J. Meeker & L. Britton, Recognizing Conditional Dependencies in Evidence: Effects of Group Deliberation (June 1987) (paper presented at the Meeting of the Law & Society Association, Washington, D.C.)). Thompson notes that, according to this study, "about a third of subjects thought the partially redundant evidence was stronger, about a third thought the two pieces of evidence were equally strong, and a third thought (correctly) that the nonredundant evidence was stronger." *Id.* at 40.

235. *Id.* at 38.

236. *Id.* at 36.

237. *Id.*

238. Thompson, *supra* note 56, at 31. See also Sally E. Renskers, Note, *Trial by Certainty: Implications of Genetic "DNA Fingerprints,"* 39 EMORY L.J. 309, 320 (1990) ("Given the complex nature of the DNA testing process, coupled with the extraordinarily high statistics quoted in court, jury members will likely be overwhelmed by such powerful identification evidence.").

jurors.<sup>239</sup> Indeed, defendants are convicted in the overwhelming majority of cases in which DNA evidence is introduced.<sup>240</sup>

Based on their overestimation of the value of confusing or conflicting evidence, jurors are likely to conclude that a suspect whose DNA matches that found at the scene of the crime is guilty. Where the match results from potentially faulty test procedures and the suspect's DNA profile is culled from the national DNA databank, however, the suspect would have reason to be particularly worried: not only would the evidence of a match probably be admitted under *Daubert* in spite of potential flaws in testing procedures, but the suspect would stand a significant chance of being convicted at trial by a jury who could not adequately analyze the value of the evidence. At present, the risk of a false conviction is too high and the personal loss of freedom too great to support the creation of a national DNA databank for use in criminal prosecutions.

#### CONCLUSION

“‘Who controls the past,’ ran the party slogan, ‘controls the future: who controls the present controls the past.’”<sup>241</sup>

The use of DNA in criminal cases has recently undergone rapid change. Whereas police initially had to identify a suspect before comparing the suspect's DNA with that found at the scene of the crime, many states and the federal government have created DNA databanks which allow a quick comparison of forensic samples against all of the DNA profiles contained in a central databank. Although most of these databanks currently contain the DNA profiles of convicted felons, violent criminals, and sex offenders, some of the authorizing statutes contain

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239. Short, *supra* note 178, at 156. See, e.g., *United States v. Brown*, 557 F.2d 541, 556 (6th Cir. 1976) (noting that “[t]he 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’”); *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974) (noting that “scientific proof may in some instances assume a posture of mystic infallibility in the eyes of a jury”); *Polk v. State*, 612 So. 2d 381, 393 (Miss. 1992) (noting that jurors tend “to rely solely on the evidence provided by DNA to the exclusion of other evidence”). Although the court in *Jakobetz* was not persuaded by this argument, *United States v. Jakobetz*, 747 F. Supp. 250, 262-63 (D. Vt. 1990), the statement of a South Carolina juror reinforces the conclusion that jurors may be overwhelmed by scientific testimony. This juror remarked that “[the DNA] convinced me. . . . In my opinion, you could hang somebody with DNA fingerprinting.” GENETIC WITNESS, *supra* note 1, at 89 (statement of Murrel Casselman, Jury Foreman, *State v. Ford*, 392 S.E.2d 781 (S.C. 1990)).

240. See GENETIC WITNESS, *supra* note 1, at app. A.

241. ORWELL, *supra* note 2.

language that could support the creation of a national databank that would contain the DNA profile of every American citizen.

While this national DNA databank would probably survive a Fourth Amendment challenge and its results would be admissible under Rule 702, its creation, given current testing procedures, should nevertheless be prohibited. A declaration of a match may be erroneous as a result of the quality of the samples, the testing process, and interpretation by the analyst. Without standardized procedures that have been rigorously tested and validated, the risk of a false conviction due to faulty profiling procedures is unacceptably high. Although case law suggests that questions as to the reliability of the scientific testimony affect the weight rather than the admissibility of the evidence, it is unclear whether a jury can adequately evaluate this complex and confusing declaration of a match. Unfortunately, these factors work together to create a strong presumption of guilt in the minds of jurors that may be insurmountable by a suspect. Without universal standards and regulation, Congress should not create a national DNA databank because the risk is too great that suspects would be linked through faulty data to crimes they did not commit.

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