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# BLACK AND WHITE OR RED ALL OVER? THE IMPROPRIETY OF USING CRIME SCENE DNA TO CONSTRUCT RACIAL PROFILES OF SUSPECTS

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## I. INTRODUCTION

When the body of a deceased woman was found near the Mississippi River close to Baton Rouge in July 2002, DNA retrieved from the crime scene was linked to the murders of two other women in the area, and multiple law enforcement agencies subsequently began an aggressive search for the serial killer.<sup>1</sup> Using witness statements and an FBI profile, the FBI, the Louisiana State Police, and the police and sheriff's departments of Baton Rouge determined that their suspect was a young white man.<sup>2</sup> After a fourth murder believed to have been committed by the same perpetrator occurred in December 2002, officials intensified their hunt for the killer by spending over one million dollars to collect and test the DNA of some 1200 white men in the area, but they made no matches and consequently had no leads.<sup>3</sup>

In March 2003, the investigators crossed paths with molecular biologist Tony Frudakis of the company DNAPrint Genomics,<sup>4</sup> who claimed that he could ascertain the suspect's social race<sup>5</sup> by testing the crime scene DNA for 176 specific genetic markers that disclose information about physical traits.<sup>6</sup> Frudakis said that because certain markers are found predominantly in people of African, Indo-European, Native American, or South Asian roots, he could analyze their frequencies

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1. Melba Newsome, *A New DNA Test Can ID a Suspect's Race, But Police Won't Touch It*, WIREd, Dec. 20, 2007, [http://www.wired.com/print/politics/law/magazine/16-01/ps\\_dna](http://www.wired.com/print/politics/law/magazine/16-01/ps_dna) [hereinafter Newsome I]; Melba Newsome, *The Inconvenient Science of Racial DNA Profiling*, WIREd, Oct. 5, 2007, <http://www.wired.com/science/discoveries/news/2007/10/dnaprint> [hereinafter Newsome II].

2. Newsome II, *supra* note 1.

3. *Id.* This process is called a DNA dragnet. *See infra* Part II.E for a more detailed discussion.

4. Newsome I, *supra* note 1; Jessica Snyder Sachs, *DNA and a New Kind of Racial Profiling*, POPULAR SCIENCE (June 10, 2004), <http://www.popsoci.com/scitech/article/2004-06/dna-and-new-kind-racial-profiling>. DNAPrint Genomics reportedly closed sometime in February 2009 for want of financial resources to continue its work. *DNAPrint Genomics Goes Bust*, GENOMEWEB DAILY NEWS (Mar. 3, 2009), <http://www.genomeweb.com/dnaprint-genomics-goes-bust>. As of March 1, 2011, the DNAPrint Web site could still be found at <http://www.dnaprint.com>, but the website was unavailable as of August 26, 2011.

5. For the purposes of this Note, "race" refers to the artificial (that is, socially constructed) system of categorization based on, among other variables, physical appearance, geographic origin, and language. The meaning of race is fully unpacked in Part III.D, but until that definition is laid out, this Note uses the phrase "social race" to signify what we in ordinary conversation would simply call "race."

6. Newsome II, *supra* note 1.

and predict the suspect's ancestry with 99 percent accuracy, and then infer social race from this ancestry finding.<sup>7</sup> Initially skeptical of the science, officials sent Frudakis DNA samples from twenty individuals with known racial designations—and upon blind testing the samples, Frudakis correctly identified the race of each individual.<sup>8</sup>

Even more intriguing were the results of Frudakis's analysis of the Baton Rouge serial killer's DNA. Using a test he called DNAWitness, Frudakis concluded that the suspect's "biogeographical ancestry" was 85 percent Sub-Saharan African and 15 percent Native American, which left, in his words, "no chance that this is a Caucasian. No chance at all."<sup>9</sup>

The homicide investigators changed course upon receiving Frudakis's results, amending the killer's profile to include all racial categories and following up on tips about nonwhite suspects that they had previously disregarded.<sup>10</sup> Two months later, in May 2003, officials arrested Derrick Todd Lee, a black man who had voluntarily given police a DNA sample when he was questioned about unrelated killings.<sup>11</sup> Lee was convicted of murder in October 2004 and sentenced to death.<sup>12</sup> Authorities say that Lee's DNA inculcates him for the deaths of seven women total.<sup>13</sup> The Louisiana Supreme Court refused to reconsider his conviction and sentence in January 2008,<sup>14</sup> and in October 2008 the U.S. Supreme Court similarly denied certiorari.<sup>15</sup>

Lee's case—or more precisely, the investigation techniques leading up to his arrest—raises important questions about how law, genetic science, and the social construct of race interact. Many scholars have devoted research to the racial imbalance that plagues the penal system,<sup>16</sup> and

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7. *Id.* For Frudakis's own explanation of the science, see TONY N. FRUDAKIS, MOLECULAR PHOTOFITTING: PREDICTING ANCESTRY AND PHENOTYPE USING DNA (2008).

8. Newsome II, *supra* note 1.

9. *Id.*; Sachs, *supra* note 4.

10. Newsome II, *supra* note 1; Suzanne Smalley et al., *Hunting a Killer*, NEWSWEEK, May 30, 2003, available at <https://www.thedailybeast.com/newsweek/2003/05/30/hunting-a-killer.html>.

11. Sachs, *supra* note 4; Smalley et al., *supra* note 10.

12. *State v. Lee*, 964 So. 2d 967 (La. Ct. App. 2007); Lorrie Metzler, *Execution Date Pending for Baton Rouge Serial Killer Derrick Todd Lee*, BAYOU BUZZ LOUISIANA DAILY NEWS (June 29, 2009), [http://www.bayoubuzz.com/News/Louisiana/Medical\\_and\\_Healthcare/Execution\\_Date\\_Pending\\_For\\_Baton\\_Rouge\\_Serial\\_Killer\\_Derrick\\_Todd\\_Lee\\_\\_9100.asp](http://www.bayoubuzz.com/News/Louisiana/Medical_and_Healthcare/Execution_Date_Pending_For_Baton_Rouge_Serial_Killer_Derrick_Todd_Lee__9100.asp).

13. *Review of Death Sentence for Derrick Todd Lee Refused*, WWLTV.COM, Mar. 8, 2008, [www.wwltv.com/local/stories/wwl030808tptoddllee.369896b1.html#](http://www.wwltv.com/local/stories/wwl030808tptoddllee.369896b1.html#).

14. *Id.* See also *State v. Lee*, 977 So. 2d 896 (La. 2008) (denying petition for certiorari).

15. *Lee v. Louisiana*, 129 S. Ct. 130 (2008).

16. *E.g.*, David C. Baldus & George Woodworth, *Race Discrimination in the Administration of the Death Penalty: An Overview of the Empirical Evidence with Special Emphasis on the Post-1990 Research*, 41 CRIM. L. BULL. 6 (2003) (examining recent race disparities of defendants sentenced to

attorneys have debated the proper mechanics of DNA evidence admissibility in court (especially in regard to random-match probability computations that factor in a defendant's membership in a certain racial group).<sup>17</sup> But little attention has been given to the law as a legitimizing force in society and the consequences that might follow if the criminal justice system were to utilize, and by implication condone, conclusions about racial identity based on DNA.

This Note explores the role that DNA-based social race determinations should play in criminal investigations. In Part II, I begin with a general description of what DNA is and how it is utilized to aid law enforcement efforts, including a basic overview of the processes used by programs that claim to divine racial categorization from a person's DNA. I then examine the evolution of American conceptions of social race in Part III, highlighting the way racial designations have shaped and been shaped by the U.S. legal system from colonial times until the present. This section focuses in particular on folk notions of race, racial "science" and eugenics, and the impact of cultural anthropology on current understandings of race as a social product. Part IV explores the fallacy of the claim that racial identity can be determined from DNA and the impropriety of conducting criminal investigations based on such an assertion. Lastly, Part V concludes.

## II. DNA IN THE LEGAL CONTEXT

The law has a few different uses for DNA. For example, thanks to the development of increasingly sophisticated technology, DNA that has been taken from crime scenes and preserved in an appropriate manner can be tested later and used to exonerate incarcerated persons who were wrongly convicted.<sup>18</sup> Perhaps most commonly, DNA can serve identification

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capital punishment); Pilar Ossorio & Troy Duster, *Race and Genetics: Controversies in Biomedical, Behavioral, and Forensic Sciences*, 60 AM. PSYCHOLOGIST 115, 122–24 (2005) (discussing racial profiling and offering data to show that minority racial groups are overrepresented in arrest and incarceration statistics).

17. *E.g.*, *People v. Wilson*, 136 P.3d 864, 869–72 (Cal. 2006) (discussing the admissibility of random-match probabilities calculated using separate databases for Caucasian, Hispanic, and African American populations, and holding that "[i]f the race is not known or if the population is of racially mixed ancestry, the calculations can be made with each of the appropriate databases and these presented to the court"); Christian B. Sundquist, *Science Fictions and Racial Fables: Navigating the Final Frontier of Genetic Interpretation*, 25 HARV. BLACKLETTER L.J. 57, 78–93 (2009) (summarizing California case law on the admissibility of DNA evidence and arguing that random-match statistics should be inadmissible because "a racial probability estimate does not *reasonably* affect the trier of fact's assessment of the defendant's guilt").

18. Ossorio & Duster, *supra* note 16, at 120.

purposes at trial, such as when lawyers introduce as evidence a random-match probability between DNA from a crime scene and a defendant's DNA.<sup>19</sup> This Note concerns the use of DNA not in post-conviction or court contexts, but in the pre-arrest stage of building a suspect profile.<sup>20</sup>

#### A. DNA DEFINED

DNA, the acronym for deoxyribonucleic acid, is the genetic blueprint of all living organisms.<sup>21</sup> It holds the information that cells need to replicate and to produce enzymes for proper function, and it plays a role in determining characteristics such as eye and skin color.<sup>22</sup> Human DNA encodes all of this information in repeated sequences of four nucleic acid bases: adenine, guanine, cytosine, and thymine (referred to as A, G, C, and T, respectively), which pair up A-T and C-G to create a double helix strand resembling a ladder.<sup>23</sup> Scientists identify certain distinct segments of a DNA strand as genes, which are recognized as individual proteins.<sup>24</sup> Variant forms of a gene—that is, alternate nucleotide sequences at the same place on different people's DNA—are called alleles.<sup>25</sup>

DNA strands are condensed into microscopic structures called chromosomes, which are located in the nucleus of every cell, and each human cell nucleus holds forty-six chromosomes arranged into twenty-three pairs.<sup>26</sup> Of each pair, one chromosome is inherited from the father and the other is contributed by the mother; this is how genetic material is transmitted from generation to generation.<sup>27</sup> A person's DNA is the same whether taken from his or her blood, saliva, bone, or other bodily fluids or tissues,<sup>28</sup> and every individual's DNA is unique unto itself (the only exception being identical twins).<sup>29</sup>

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19. *Id.* See also *supra* note 17.

20. For a more precise explanation of how suspect profiling and random-match probabilities use DNA-related computations differently, see Jonathan Kahn, *Race No Longer Relevant in DNA Trial Evidence*, 24 CRIM. JUST. 39, 39 (2009) (summarizing that for random-match estimates, "race is used to generate odds, whereas in DNA profiling odds are used to generate race").

21. *Basic Biology of DNA*, DNA INITIATIVE, <http://www.dna.gov/basics/biology> (last visited Aug. 26, 2011) [hereinafter *Basic Biology of DNA*, DNA INITIATIVE].

22. Sundquist, *supra* note 17, at 66. See also *infra* text accompanying notes 35, 192–95.

23. Sundquist, *supra* note 17, at 66.

24. *Id.* at 67.

25. David H. Kaye, *The Science of DNA Identification: From the Laboratory to the Courtroom (and Beyond)*, 8 MINN. J.L. SCI. & TECH. 409, 410 (2007).

26. William M. Richman, *Genetic Residues of Ancient Migrations: An End to Biological Essentialism and the Reification of Race*, 68 U. PITT. L. REV. 387, 393 (2006).

27. Sundquist, *supra* note 17, at 67.

28. *Basic Biology of DNA*, DNA INITIATIVE, *supra* note 21.

29. *About Forensic DNA*, DNA INITIATIVE, <http://www.dna.gov/basics> (last visited Aug. 26,

Scientific researchers estimate that the human genome contains some three billion nucleotide bases total, which they have divided into approximately 30,000 to 35,000 genes.<sup>30</sup> They have also concluded, based on research ventures such as the Human Genome Project, that any two unrelated human beings plucked at random from anywhere on Earth will have one differing nucleotide in 1000 to 5000.<sup>31</sup> In other words, 99.9 percent of the human genome is identical among all people across the globe; only 0.1 percent of genetic material, or three million bases, will vary from person to person.<sup>32</sup>

Of those three million nucleotide bases, scientists estimate that only about 200,000 (which comes out to 0.0067 percent of the entire genome) account for differences in humans' health, behavior, and other characteristics.<sup>33</sup> This is because most genes are noncoding, meaning that they hold no biological instructions for protein synthesis.<sup>34</sup> Furthermore, genetic researchers agree that the overwhelming majority of human phenotypic (physical) traits cannot be traced to a single gene but instead are shaped by numerous genetic and nongenetic factors.<sup>35</sup>

## B. DNA AND LAW COLLIDE

DNA's appearance in the legal system is relatively recent. The process of identifying a person by DNA—colloquially known as DNA “fingerprinting,” “typing,” or “profiling”—was first conceived in 1984 by Alec Jeffreys, an English geneticist doing research at the University of Leicester.<sup>36</sup> Jeffreys observed that some parts of human DNA strands contained sequences of base pairs that were repeated multiple times but that

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2011) [hereinafter *About Forensic DNA*, DNA INITIATIVE].

30. Sheila Jasanoff, *Just Evidence: The Limits of Science in the Legal Process*, 34 J.L. MED. & ETHICS 328, 338 (2006); Ossorio & Duster, *supra* note 16, at 117; Sundquist, *supra* note 17, at 67.

31. Pilar N. Ossorio, *About Face: Forensic Genetic Testing for Race and Visible Traits*, 34 J.L. MED. & ETHICS 277, 279 (2006). More information about the Human Genome Project can be found at its website, [http://www.ornl.gov/techresources/Human\\_Genome/home.shtml](http://www.ornl.gov/techresources/Human_Genome/home.shtml).

32. Sundquist, *supra* note 17, at 67; *About Forensic DNA*, DNA INITIATIVE, *supra* note 29.

33. Vence L. Bonham, Esther Warshauer-Baker & Francis S. Collins, *Race and Ethnicity in the Genome Era: The Complexity of the Constructs*, 60 AM. PSYCHOLOGIST 9, 12 (2005).

34. Sundquist, *supra* note 17, at 67.

35. *Id.*; Sachs, *supra* note 4 (summarizing that “genotype plus environment equals phenotype”). See also *infra* Part IV.A (describing environmental and evolutionary forces that produce phenotypic variation).

36. Kaye, *supra* note 25, at 412; Robin Williams & Paul Johnson, *Inclusiveness, Effectiveness and Intrusiveness: Issues in the Developing Uses of DNA Profiling in Support of Criminal Investigations*, 34 J.L. MED. & ETHICS 234, 234 (2006); *History of Forensic DNA Analysis*, DNA INITIATIVE, <http://www.dna.gov/basics/analysisishistory> (last visited Aug. 26, 2011) [hereinafter *History of Forensic DNA Analysis*, DNA INITIATIVE].

the number of repeats differed from person to person.<sup>37</sup> These repeated segments are now known as variable number of tandem repeats (“VNTRs”).<sup>38</sup> By measuring the varying lengths of these VNTRs, Jeffreys discovered a way to use DNA to distinguish one person from the next.<sup>39</sup> DNA fingerprinting has since become widely utilized by law enforcement agencies worldwide, especially in Asia, Europe, and the United States.<sup>40</sup>

### C. CODIS AND NDIS

Following Jeffreys’s discovery in the mid-1980s, most DNA databases in America were state run, as the majority of crimes are prosecuted in state court.<sup>41</sup> Beginning in 1990, the FBI began a database project known as the Combined DNA Index System (“CODIS”) with fourteen state and local laboratories.<sup>42</sup> Early databases were limited to DNA samples from adult sexual offenders, such as convicted rapists, and murderers.<sup>43</sup> The DNA banks were so successful with helping to solve violent crimes that Congress passed the Violent Crime Control and Law Enforcement Act of 1994, which contained the DNA Identification Act of 1994,<sup>44</sup> authorizing the FBI to establish the National DNA Index System (“NDIS”), a national database that became operational in 1998.<sup>45</sup>

Currently, CODIS allows crime labs at the federal, state, and local levels to share and compare DNA profiles electronically, which means that crimes committed in different jurisdictions can be linked to one another and to offenders if they are already in a database. This is a powerful tool for law enforcement efforts, especially because all fifty states participate in CODIS, and some state databases have expanded to include DNA samples of all convicted felons (not just those found guilty of certain violent crimes), juvenile offenders, some misdemeanants, and, in an increasing

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37. *History of Forensic DNA Analysis*, DNA INITIATIVE, *supra* note 36.

38. *Id.*

39. Kaye, *supra* note 25, at 412.

40. *History of Forensic DNA Analysis*, DNA INITIATIVE, *supra* note 36 (“Today over 150 public forensic laboratories and several dozen private paternity testing laboratories conduct hundreds of thousands of DNA tests annually in the United States.”).

41. Ossorio & Duster, *supra* note 16, at 124.

42. *CODIS—Crime*, FBI, [http://www.fbi.gov/about-us/lab/codis/codis\\_crime](http://www.fbi.gov/about-us/lab/codis/codis_crime) (last visited Aug. 26, 2011) [hereinafter FBI, *CODIS—Crime*].

43. Mark A. Rothstein & Meghan K. Talbot, *The Expanding Use of DNA in Law Enforcement: What Role for Privacy?*, 34 J.L. MED. & ETHICS 153, 153 (2006).

44. DNA Identification Act of 1994, Pub. L. 103-322, § 210301-06, 108 Stat. 1796, 2065 (1994); Violent Crime Control and Law Enforcement Act of 1994, Pub. L. 103-322, 108 Stat. 1796.

45. Ossorio & Duster, *supra* note 16, at 124 & n.8; Sundquist, *supra* note 17, at 68; FBI, *CODIS—Crime*, *supra* note 42.

number of states, even arrestees.<sup>46</sup>

The FBI estimates that as of July 2011, NDIS holds over 9,965,486 offender profiles (DNA samples collected from convicted persons and which thus have known identities) and 384,604 forensic profiles (DNA samples recovered from crime scenes which have not been identified).<sup>47</sup> The FBI also reports that CODIS has provided officials with over 149,200 hits (DNA matches), aiding over 143,200 investigations total.<sup>48</sup> Currently, more than 170 crime laboratories in the United States utilize NDIS. Across the globe, over forty law enforcement agencies in more than twenty-five countries have patterned their DNA databases after CODIS.<sup>49</sup>

#### D. THIRTEEN CORE STR LOCI

Forensic laboratories most commonly perform DNA fingerprinting by comparing short-tandem repeat (“STR”) markers.<sup>50</sup> STRs are like VNTRs but much shorter, usually consisting of two to six nucleotide base pairs, making them easier to study.<sup>51</sup> STRs are examined using a technique called polymerase chain reaction analysis.<sup>52</sup>

To distinguish one individual from another, investigators look at STR markers at thirteen specific places, or loci, on human chromosomes.<sup>53</sup> These thirteen core STR loci were specifically chosen by the FBI in 1997 as the standard for CODIS because of their high potential for variability, which increases the confidence level with which officials differentiate the DNA profiles of any two people (except identical twins).<sup>54</sup> STR alleles at these loci differ enough from person to person so that the probability of two

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46. Ossorio & Duster, *supra* note 16, at 124–25; Rothstein & Talbott, *supra* note 43, at 153. Whether DNA collection should be so liberal is not an issue I tackle in this Note.

47. *Combined DNA Index System*, DNA INITIATIVE, <http://www.dna.gov/dna-databases/codis> (last visited Aug. 26, 2011); *CODIS—NDIS Statistics*, FBI, <http://www.fbi.gov/about-us/lab/codis/ndis-statistics> (last visited Aug. 26, 2011) [hereinafter FBI, *CODIS—NDIS Statistics*]. The latter Web page also contains state-by-state statistics.

48. FBI, *CODIS—NDIS Statistics*, *supra* note 47.

49. FBI, *CODIS—Crime*, *supra* note 42.

50. *Steps in DNA Sample Processing*, DNA INITIATIVE, <http://www.dna.gov/basics/analysis/steps> (last visited Aug. 26, 2011). Information about other methods of DNA identification, such as Y-chromosome and mitochondrial DNA analyses, is available at this site.

51. Kaye, *supra* note 25, at 417; Sundquist, *supra* note 17, at 68. *See also supra* Part II.B (explaining how VNTRs are used for DNA profiling).

52. Sundquist, *supra* note 17, at 68.

53. *Id.* at 69.

54. Sachs, *supra* note 4; *STR Analysis*, DNA INITIATIVE, <http://www.dna.gov/basics/analysis/str> (last visited Aug. 26, 2011) [hereinafter *STR Analysis*, DNA INITIATIVE]. For information about the thirteen core STR loci, visit <http://www.cstl.nist.gov/biotech/strbase/fbicore.htm>.

randomly selected individuals having the same STR markers is greater than one in one billion and can even be close to one in one hundred trillion.<sup>55</sup>

The thirteen STR markers were also purposely selected because these loci are noncoding “junk” regions of the human genome; alleles at these loci do not create differences in a person’s physical or physiological structure.<sup>56</sup> Mindful of potential political backlash, the STR loci do not include markers associated with physical traits or ancestral geographic origins, both of which have been considered indicative of social race in the past.<sup>57</sup> The DNA Advisory Board wanted CODIS identifications to be accurate and to have nothing to do with genetic markers that might be linked to racial groups.<sup>58</sup>

#### E. DNA DRAGNETS

When DNA from a crime scene does not match a person in a database, an investigative tool sometimes used to apprehend the offender is a DNA dragnet, also known as a DNA “sweep.”<sup>59</sup> Police usually resort to dragnets when their search does not turn up other leads.<sup>60</sup> To conduct a dragnet, law enforcement officials collect DNA from a large group—hundreds or thousands—of individuals who are asked to submit samples (usually via cheek swabs) because these persons lived, worked, or were otherwise present in the general vicinity of the crime at the time it was committed, and they fit a basic description of the perpetrator.<sup>61</sup>

DNA dragnets are commonly used in the United Kingdom but less so in other parts of Europe and in America.<sup>62</sup> As of 2004, eighteen dragnets had been employed in the United States, one being the collection in the

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55. Sundquist, *supra* note 17, at 69; *STR Analysis*, DNA INITIATIVE, *supra* note 54.

56. Susanne B. Haga, *Policy Implications of Defining Race and More by Genome Profiling*, GENOMICS, SOC’Y & POL’Y J., May 2006, at 57, 59; Richman, *supra* note 26, at 397.

57. Newsome II, *supra* note 1. *See also infra* Part III.B (explaining that scientists in the eighteenth and nineteenth centuries attempted to divide humans into races based on criteria of phenotype and geographic origin).

58. Newsome II, *supra* note 1; Sachs, *supra* note 4. *See also infra* Part II.F (discussing further the genetic markers correlated to ancestry and therefore sometimes linked to race).

59. Laura A. Matejik, *DNA Sampling: Privacy and Police Investigation in a Suspect Society*, 61 ARK. L. REV. 53, 62 (2008).

60. Rothstein & Talbott, *supra* note 43, at 155–56.

61. *Id.* (noting that the largest known dragnet collected DNA from 16,400 men in Germany); Ossorio & Duster, *supra* note 16, at 120.

62. Rothstein & Talbott, *supra* note 43, at 155. For more about the role DNA plays in law enforcement efforts in the United Kingdom, see Duncan Carling, *Less Privacy Please, We’re British: Investigating Crime with DNA in the U.K. and the U.S.*, 31 HASTINGS INT’L & COMP. L. REV. 487 (2008).

Baton Rouge serial killer hunt.<sup>63</sup> In light of their low success rate<sup>64</sup> and outrage over personal privacy concerns,<sup>65</sup> it is easy to understand why DNA dragnets have been criticized for being “costly, inefficient and fraught with potential rights violations.”<sup>66</sup>

#### F. DNAWITNESS AND LIKE ANALYSES

Fingerprinting programs like DNAWitness use ancestry-informative markers (“AIMs”) to predict a suspect’s social race.<sup>67</sup> The reasoning behind the use of AIMs is that there are varying frequencies of these genetic markers among different populations around the world—populations with distinct geographic origins (hence the descriptor “ancestry-informative”) and that bear some correlation to racial groups.<sup>68</sup>

The DNA analysis used by DNAWitness involved examining 176 genetic markers that allegedly reveal the most information about a person’s phenotypic features.<sup>69</sup> Based on relative frequencies of these markers, scientists cluster people into categories that roughly correspond to continents.<sup>70</sup> For example, some AIMs are found principally in individuals with African ancestry, and others are most common in people with Indo-European, Native American, or South Asian heritage.<sup>71</sup> In other words, based on an individual’s counts of specific AIMs, researchers assign him or her to a certain region (or regions) on the globe.<sup>72</sup> No single genetic marker can reveal a person’s geographic origins, but Frudakis claimed that he could predict ancestry with 99 percent accuracy by analyzing hundreds of AIMs together and tallying their frequencies.<sup>73</sup> Racial identity is then deduced from this ancestry prediction.

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63. Rothstein & Talbott, *supra* note 43, at 156.

64. See Matejik, *supra* note 59, at 62 & n.63 (discussing a 2004 study of DNA dragnets in the United States which concluded that only one dragnet out of eighteen led to identification of a suspect).

65. E.g., Kevin Bersett, *Victims Challenge Police Use of Controversial ‘DNA Dragnets,’* THE NEW STANDARD (Sept. 27, 2004), <http://newstandardnews.net/content/index.cfm/items/1044>.

66. Rothstein & Talbott, *supra* note 43, at 156 (quoting Jeffrey S. Grand, *The Bleeding of America: Privacy and the DNA Dragnet*, 23 CARDOZO L. REV. 2277, 2280–81 (2002)).

67. Kahn, *supra* note 20, at 39.

68. Haga, *supra* note 56, at 58. Similar technology has been used by DNA Genomics and other companies to provide private individuals with personal information about their ancestry. E.g., Anita Hamilton, *Can DNA Reveal Your Roots?*, TIME MAGAZINE, July 5, 2005, available at <http://www.time.com/time/magazine/article/0,9171,1079508,00.html>.

69. Newsome II, *supra* note 1.

70. Richman, *supra* note 26, at 436–37. See also *infra* Part. IV.B.2 (explaining the fluidity of these clusters).

71. Newsome II, *supra* note 1.

72. Ossorio, *supra* note 31, at 281.

73. Newsome II, *supra* note 1.

Scientists explain the varying frequencies of AIMs by pointing to migration patterns of ancient humans. Based on archeological and genetic evidence, they believe the first human populations originated in Africa about 200,000 years ago and began to disperse some 30,000 to 50,000 years ago, eventually spreading throughout the world.<sup>74</sup> Because of their geographic separation, these groups were sexually isolated (that is, there was no intergroup reproduction) and were thus genetically cut off from one another as well.<sup>75</sup> Over tens of thousands of years, evolutionary forces such as genetic drift, the founder effect, and natural selection paved the way for genetic disparities among different populations.<sup>76</sup> Within-group reproduction resulted in higher occurrences of certain genetic markers in some populations than in others, and as a consequence, people groups that are geographically close share more genetic similarities than those that are distant—the premise for AIMs-based ancestry analyses.<sup>77</sup>

At present, the United Kingdom and the Netherlands allow forensic use of DNA to predict racial identity,<sup>78</sup> the Netherlands being the only country with legislation that explicitly permits doing so.<sup>79</sup> In contrast, wary of ethical and social consequences, Belgium, Germany, and three states—Indiana, Rhode Island, and Wyoming—expressly forbid using DNA to infer traits other than sex.<sup>80</sup> The law in other jurisdictions and other countries is silent,<sup>81</sup> as the issue is just beginning to become a subject of debate.

### III. THE EMERGENCE OF RACE

The concept of race carries different meanings for different people, especially in America, and to say that the topic is complex is a grave

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74. Ossorio, *supra* note 31, at 280; Richman, *supra* note 26, at 401; Newsome II, *supra* note 1. For a more detailed review of how scientists use genetic mutations to trace human migration patterns, see Richman, *supra* note 26, at 396–400.

75. Newsome II, *supra* note 1.

76. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 12. For definitions of these evolutionary processes, see *id.* at 10.

77. Ossorio, *supra* note 31, at 280; Newsome II, *supra* note 1.

78. Gautam Naik, *To Sketch a Thief: Genes Draw Likeness of Suspects*, WALL ST. J., Mar. 27, 2009, available at <http://online.wsj.com/article/SB123810863649052551.html>.

79. Bert-Jaap Koops & Maurice Schellekens, *Forensic DNA Phenotyping: Regulatory Issues*, 9 COLUM. SCI. & TECH. REV. 158, 168–69 (2008) (explaining a 2003 amendment to the Dutch code of criminal procedure, *Wetboek van Strafvordering*, which allows law enforcement to assess crime scene DNA for phenotypic markers and draw conclusions about an unknown suspect's race based on these "externally perceptible traits").

80. *Id.* at 171 (noting the absence of federal legislation regarding DNA-based racial profiling, and specifying the state statutes that prohibit it); Naik, *supra* note 78.

81. Koops & Schellekens, *supra* note 79, at 168.

understatement. Racial divisions and tensions are to blame for well-known atrocities such as slavery and war, and because these are neatly documented in history textbooks, we would like to think we as a society have outgrown racial injustice and inequality, and perhaps race itself. But to this day, misunderstanding between people of different races—and ignorance of people of all races—continues to steal dignity and liberty, limit political and socioeconomic opportunity, and cost lives.<sup>82</sup>

The law has had a special hand in shaping our country's understanding of race because the legal system has a legitimizing function on those it governs. As much as it manifests people's political opinions, preferences for a type of property system and economic structure, or beliefs about what is morally right and wrong, the law also defines those notions, perhaps in ways we do not intend and are not even aware of.<sup>83</sup> Through the boundaries it sets—condoning some acts and punishing others—the legal system subtly approves or criticizes certain behaviors and their underlying values. In particular, by creating or acknowledging social categories, the law tells us what dimensions of personhood matter and which do not.<sup>84</sup> In this vein, the American legal system has had an intimate and overlooked role in creating and fashioning conceptions of race.

#### A. FOLKTALES OF A KNOWABLE ESSENCE

Race was not a significant social designation to early American

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82. E.g., ARIELA J. GROSS, WHAT BLOOD WON'T TELL: A HISTORY OF RACE ON TRIAL IN AMERICA 305 (2008) (discussing the differences in income level, education, patterns of neighborhood segregation, and interracial marriage that continue to exist in America); Audrey Smedley & Brian D. Smedley, *Race as Biology Is Fiction, Racism as a Social Problem Is Real: Anthropological and Historical Perspectives on the Social Construction of Race*, 60 AM. PSYCHOLOGIST 16, 22–23 (2005) (citing present-day inequalities across racial groups in education, health care, and mortgage lending).

83. Peggy Pascoe, *Miscegenation Law, Court Cases, and Ideologies of "Race" in Twentieth-Century America*, in SEX, LOVE, RACE: CROSSING BOUNDARIES IN NORTH AMERICAN HISTORY 464, 466 (Martha Hodes ed., 1999) (“[T]he legal system does more than just reflect social or scientific ideas about race; it also produces and reproduces them.”); Robert W. Gordon, *Critical Legal Histories*, 36 STAN. L. REV. 57, 109 (1984) (examining how legal categories mold social perceptions and arguing that “the power exerted by a legal regime consists less in the force that it can bring to bear against violators of its rules than in its capacity to persuade people that the world described in its images and categories is the only attainable world in which a sane person would want to live”).

84. IAN HANEY-LÓPEZ, WHITE BY LAW: THE LEGAL CONSTRUCTION OF RACE 125 (1996) (“The necessary persistence of legal classifications of race gives law a continuing role in the construction of racial identities by legitimating the practice of categorization and by limiting possible conceptions of who we are.”); R. Richard Banks, *The Color of Desire: Fulfilling Adoptive Parents' Racial Preferences Through Discriminatory State Action*, 107 YALE L.J. 875, 960 (1998) (“Legal institutions can express culture, or they can shape it. Where legal institutions help shape culture, they do so in part by instantiating and reinforcing particular conceptions of the nature of persons and their good.” (quoting MARGARET JANE RADIN, *CONTESTED COMMODITIES* 173 (1996))).

settlers.<sup>85</sup> When the first Africans were brought to America around 1619, colonial law did not distinguish between black indentured servants and those from Europe who were white; for example, both could own property, make contracts, become free by paying off their servitude debt, and legally intermarry.<sup>86</sup> Enslavement in this form, whether of whites or blacks, was viewed as a financial arrangement that balanced the owner's right to private property and the servant's right to social equality and freedom.<sup>87</sup> Society was stratified primarily by economic class rather than divided into "nations" or "peoples," terms synonymous with race that were used to refer to individuals with a shared geographic origin and language.<sup>88</sup>

Toward the end of the eighteenth century, the economic rationale for indentured servitude gradually lost strength because it could not be reconciled with a belief in universal equality, as espoused by Christianity and the then-recent Declaration of Independence.<sup>89</sup> Furthermore, the colonists' need for free agricultural labor was growing, and it became clear that shrinking Native American populations would not suffice to meet that demand.<sup>90</sup> As a consequence, white, propertied Americans found themselves looking for new justifications to keep Africans (who by then were the country's primary labor source) enslaved.<sup>91</sup> Focus shifted to the supposedly natural inferiority of Africans to validate this unequal treatment.<sup>92</sup> Moreover, rather than recognizing them as Africans or by their nations of origin, the label "Negro" arose—creating a race out of many diverse people groups—and it was not long before the designation became indicative of enslavement.<sup>93</sup>

Race soon connoted an exclusive "type," "breed," or even "species," and it provided colonists with the foundation for a hierarchical social structure that would have otherwise been incompatible with Christian theology and American democratic ideals.<sup>94</sup> The major races recognized by eighteenth-century Americans were white Europeans, Native Americans,

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85. See GROSS, *supra* note 82, at 17.

86. *Id.* at 17–18; Christian B. Sundquist, *The Meaning of Race in the DNA Era: Science, History and the Law*, 27 TEMP. J. SCI. TECH. & ENVTL. L. 231, 239 (2008).

87. Sundquist, *supra* note 86, at 239 (describing slavery as "a 'necessary evil' to support economic progress").

88. GROSS, *supra* note 82, at 17.

89. Sundquist, *supra* note 86, at 239.

90. *Id.* See also GROSS, *supra* note 82, at 18.

91. GROSS, *supra* note 82, at 22 (pointing out that treating slaves "as racialized property was the foundation of the colonial and U.S. economies").

92. Sundquist, *supra* note 86, at 240.

93. GROSS, *supra* note 82, at 22.

94. Smedley & Smedley, *supra* note 82, at 19.

and African Negroes; they were ranked in that order based on their allegedly inherent inequalities.<sup>95</sup> Whereas Native Americans were “otherized” as “noble” savages, blacks were singled out as the lowest sect of humankind, a people fit for slavery because of essential differences from the white majority.<sup>96</sup>

The legal system perpetuated this social scheme through the kind of evidence it admitted to “prove” race at trials. Adjudications of racial identity turned largely on reputation evidence: testimony of community members about their understanding of race and whether they thought a petitioner was black or white.<sup>97</sup> How a person self identified took a backseat to others’ perceptions of his or her behavior and physicality. Race became a question of presenting oneself through political participation, speech, mannerisms, social activities, and so on in such a way as to be associated with whiteness or blackness.<sup>98</sup> It was a task of creating an identity that others would confirm fit the appropriate racial mold. By giving authority to these lay opinions, the law established race as a distinction that could be deduced from a person’s appearance and behavior, and a fact that everyday people could and should be able to discern with relative simplicity.

The legal system thus helped facilitate the birth of what contemporary scholars call “folk notions” or “folktales” of race. Under this framework, races were “discrete, immutable, natural categories,” each with fundamental features characterizing all its members and making that particular race distinguishable from all others.<sup>99</sup> Race was thought to bear on a person’s physical traits as well as behavior and aptitude, ultimately organizing human beings into a natural hierarchy.<sup>100</sup> Because membership in a racial group was thought to be easily knowable based on the way an individual looked and behaved, race identification became a matter of common sense.<sup>101</sup> Aside from being a divisive reality, race also became a central part of one’s personhood—a new dimension of self- and other-

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95. *Id.* at 20.

96. Sundquist, *supra* note 86, at 240. *See also* GROSS, *supra* note 82, at 20–21.

97. GROSS, *supra* note 82, at 23–24. *See, e.g.*, Bryan v. Walton, 20 Ga. 480 (1856) (containing reputation testimony as to whether a man was a free person “of color” and therefore prohibited from selling slaves), *aff’d*, 30 Ga. 834 (1860), *aff’d*, 33 Ga. Supp. 11 (1864); Negro John Davis v. Wood, 14 U.S. 6, 8 (1816) (ruling that evidence of “general reputation” was admissible to determine the petitioner’s race, though not slave status).

98. *See* GROSS, *supra* note 82, at 31, 49–51.

99. Ossorio, *supra* note 31, at 279.

100. *Id.*

101. GROSS, *supra* note 82, at 24–25.

identification—critical because belonging to a race could have severe legal (not to mention political, economic, and social) consequences.

While the bulk of these folk notions have been debunked over the past two centuries, the understanding of race as something people instinctively “ought to know” or “can just tell” is not completely gone. Even today, when discussing race, “most people believe that they know it when they see it but arrive at nothing short of confusion when pressed to define it.”<sup>102</sup>

#### B. MISSTEPS: TAXONOMY, SOCIAL DARWINISM, AND EUGENICS

While America was taking its first steps toward nationhood, mid-eighteenth century scientists on the other side of the globe, most famously Swedish biologist Carolus Linnaeus,<sup>103</sup> undertook efforts to categorize people taxonomically. This academic interest in charting human differences according to a “natural” order stemmed largely from the development of biology and anthropology as new fields of study, as well as a residual belief in Aristotle’s Great Chain of Being—a model of the world that arranged all living organisms according to their innate, divinely ordained “essences” into a hierarchy, which represented their complexity and value.<sup>104</sup> These naturalists hypothesized that all humans belonged to one of four discrete groups, which were delineated by geographic location and physical qualities such as skin color, hair color and texture, and facial features: black Africanus, red Americanus, yellow Asiatic, and white Europeanus.<sup>105</sup> Another group, Malay (what we today might call Oceanians), was added in the late 1700s by German doctor Johann Friedrich Blumenbach.<sup>106</sup>

Not unlike racial folktales—and unsurprisingly, given that these

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102. Ossorio, *supra* note 31, at 278 (quoting Evelyn Brooks Higginbotham, *African-American Women’s History and the Metalanguage of Race*, 17 SIGNS: J. WOMEN IN CULTURE & SOC. 251, 253 (1992)). As late as the 1920s, even the Supreme Court struggled to interpret racial categories. *See, e.g.*, *United States v. Thind*, 261 U.S. 204, 214–15 (1923) (holding that an Indian man applying for citizenship under the same statute was ineligible because “‘free white persons’ are words of common speech, to be interpreted in accordance with the understanding of the common man, synonymous with the word ‘Caucasian’ only as that word is popularly understood”); *Ozawa v. United States*, 260 U.S. 178, 195, 198 (1922) (holding that a Japanese man applying for citizenship was not a “free white person” statutorily eligible for naturalization because “free white person” meant Caucasian).

103. Linnaeus’s book *Systema Naturae* was published in 1735.

104. Richman, *supra* note 26, at 390–91 (noting also that the Great Chain of Being had roots in classical philosophy and Christianity); Sundquist, *supra* note 17, at 60–61.

105. Sundquist, *supra* note 17, at 60–61; Sundquist, *supra* note 86, at 234–35.

106. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 12; Richman, *supra* note 26, at 391. Despite the way his proposals have been interpreted, Blumenbach was actually reluctant to claim the existence of discrete races, and he believed that phenotypic variation could be caused by environmental factors. *See* Sundquist, *supra* note 86, at 236.

scientists relied heavily on colonists' accounts of native people groups<sup>107</sup>—the conclusion was that these distinct types of humans exhibited “dramatic, underlying, essential differences” in appearance, moral character, intellectual capacity, temperament, and even form of government, all of which were said to be attributable to their biology.<sup>108</sup> For the first time, it seemed as if the existence of races and the resulting social inequalities had an explanation that was measurable and concrete, and therefore very convincing.

Theories about biologically rooted races took off in America as colonists continued searching for ways to justify slavery.<sup>109</sup> Scientists alleged that anatomical and physiological studies proved that blacks were a lower kind of human and that slavery was a commendable institution because it reflected natural discrepancies in white and black biology.<sup>110</sup> In this new “race science,” which purported to be objective and authoritative, America found validation for race folktales and white superiority, allowing slave owners to maintain the racial hierarchy on which the economy depended.<sup>111</sup> Racial inequality became accepted as a biological reality.

Charles Darwin's theory of evolution entered this scene in 1859, explaining morphological variation in nature as the result of gradual natural selection, which permitted the survival of those members of a species with favorable adaptations and therefore favorable genes.<sup>112</sup> Interestingly, Darwin foresaw that his theory might be misapplied to human beings, and he deliberately made efforts to warn against it.<sup>113</sup> Nevertheless, under the leadership of scholars such as philosopher Herbert Spencer, social Darwinism soon followed.<sup>114</sup> This new school of thought viewed inequalities of race and class as the product of selection forces, proposing that social hierarchy was the natural outcome of evolution.<sup>115</sup> So as not to disturb the natural order, social Darwinists advocated a “survival of the fittest” social model in which people fended for themselves and purposely

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107. Smedley & Smedley, *supra* note 82, at 21.

108. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 12; Richman, *supra* note 26, at 391–92, 422.

109. *See supra* notes 89–91 and accompanying text.

110. Sundquist, *supra* note 86, at 240.

111. Sundquist, *supra* note 17, at 61–62.

112. Sundquist, *supra* note 86, at 242 (referencing Darwin's most famous work, CHARLES DARWIN, ON THE ORIGIN OF SPECIES (1859)).

113. Sundquist, *supra* note 17, at 63 (referring to Darwin's 1871 work, CHARLES DARWIN, THE DESCENT OF MAN AND SELECTION IN RELATION TO SEX (1871)).

114. Sundquist, *supra* note 86, at 243.

115. Sundquist, *supra* note 17, at 63.

withheld aid from the economically or politically disadvantaged.<sup>116</sup> They believed that as nature's laws operated on society, the gradual outcome would be the elimination of biologically inferior people groups, namely poor classes and nonwhites.<sup>117</sup>

Social Darwinism served as the ideological springboard for the eugenics movement, which took off in the late nineteenth and early twentieth centuries. Beyond just predicting the natural elimination of inferior persons, eugenicists such as Francis Galton spearheaded an agenda to aid Mother Nature and weed them out altogether.<sup>118</sup> With feet firmly planted in race science, eugenics proponents sought to protect the alleged genetic superiority of some races and eradicate from the human genome the inferior genes of others, ultimately breeding a perfect race of humans.<sup>119</sup> They devised intelligence tests to substantiate their claims, which supposedly demonstrated with irrefutable statistical proof that blacks were biologically inferior to whites, and phrenology studies, which used skull measurements to supposedly prove the heightened intelligence of whites by virtue of their larger cranial capacities.<sup>120</sup>

Because eugenicists professed to be scholarly scientific experts, their conclusions about racial hierarchy were more or less accepted by the legal community.<sup>121</sup> At this time, race was a particularly salient topic in America because Civil War Reconstruction was still somewhat recent and Jim Crow laws were in effect, immigration was booming at alarming levels, and World War I was underway.<sup>122</sup> In response to these historical circumstances, race science had a profound impact on American anti-miscegenation laws, strident immigration policies, and even forced-sterilization statutes.<sup>123</sup>

For instance, eugenicists frowned upon interracial marriage because they believed that biracial offspring would bear the traits of the "inferior" parent and that race mixing therefore threatened the purity of superior

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116. Sundquist, *supra* note 86, at 243. Contrary to most people's belief that Darwin coined the phrase "survival of the fittest," this is actually Spencer's expression. 2 HERBERT SPENCER, THE PRINCIPLES OF BIOLOGY 53 (1867) ("[N]atural selection will favour the more upright-growing forms: individuals with structures that lift them above the rest, are the fittest for the conditions; and by the continual survival of the fittest, such structures must become established.").

117. Sundquist, *supra* note 17, at 63.

118. Sundquist, *supra* note 86, at 244.

119. Sundquist, *supra* note 17, at 63; Sundquist, *supra* note 86, at 245.

120. Sundquist, *supra* note 17, at 64; Sundquist, *supra* note 86, at 241.

121. GROSS, *supra* note 82, at 211–12.

122. *Id.*; Sundquist, *supra* note 86, at 246–47.

123. Sundquist, *supra* note 17, at 63–64; Sundquist, *supra* note 86, at 244–48.

racism.<sup>124</sup> Laws such as Virginia's Racial Integrity Act thus banned marriage between white and nonwhite persons.<sup>125</sup> An onslaught of immigration statutes, most infamously the Chinese Exclusion Act of 1882, denied admission and naturalization to people from Asia and also from Southern and Eastern Europe, as Northern Europeans were thought to be the "Anglo-Saxon" American ideal.<sup>126</sup> Forced sterilization was implemented in several states to ensure that individuals with unwanted biological material would not infect the gene pool.<sup>127</sup>

Court opinions from this period reflected and propagated the same xenophobia and racism that saturated eugenics. For example, in his *Plessy v. Ferguson* dissent, Justice Harlan made noble arguments against separate but equal facilities for whites and blacks, but he also noted that a "Chinaman" was so unlike whites as to be categorically barred from citizenship.<sup>128</sup> A mandatory sterilization statute was upheld in *Buck v. Bell* because, as Justice Holmes stated, the state's interest in public welfare permitted it to "prevent those who are manifestly unfit from continuing their kind."<sup>129</sup> The last of state anti-miscegenation statutes was not ruled unconstitutional until the mid-twentieth-century.<sup>130</sup>

These examples offer a minute snapshot of how American countrymen and courts alike subscribed to race science—the belief that race was fixed,

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124. Sundquist, *supra* note 86, at 245. Anti-miscegenation laws existed for almost another century after the rise of eugenics. See *infra* note 125 and accompanying text.

125. Racial Integrity Act of 1924, VA. CODE ANN. §§ 20-54, 20-59 (1924) (making marriage between a white person and a "colored" person a felony) (repealed 1968).

126. GROSS, *supra* note 82, at 217–18; Sundquist, *supra* note 86, at 246. See, e.g., Johnson-Reed Act, ch. 190, 43 Stat. 153, 159 (1924) (creating immigration quotas based on the 1890 census, which disproportionately limited the number of Southern and Eastern Europeans who could gain admission to America) (repealed 1965); Immigration Act of 1917, ch. 29, 39 Stat. 874, 875 (blocking immigration from "Asiatic" regions in East Asia and the Pacific Islands) (repealed 1965); Chinese Exclusion Act, ch. 126, 22 Stat. 58, 59 (1882) (suspending immigration of Chinese laborers for ten years) (repealed 1943).

127. Sundquist, *supra* note 86, at 246 ("According to conservative estimates, over forty-five thousand individuals were sterilized in thirty states pursuant to state statutes aimed at 'socially inadequate' persons.").

128. *Plessy v. Ferguson*, 163 U.S. 537, 561 (1896) (Harlan, J., dissenting) ("There is a race so different from our own that we do not permit those belonging to it to become citizens of the United States . . . I allude to the Chinese race."). For more about the relationship between whiteness and citizenship, see GROSS, *supra* note 82, at 49, 232.

129. *Buck v. Bell*, 274 U.S. 200, 207 (1927). This resulted in Buck's sterilization because she was declared mentally retarded. Nevertheless, before the case got to the U.S. Supreme Court, the Virginia Supreme Court acknowledged that the statute at issue mandated sterilization "to promote the welfare of society by mitigating race degeneracy and raising the average standard of intelligence of the people of the state." *Buck v. Bell*, 130 S.E. 516, 519 (Va. 1925).

130. See *Loving v. Virginia*, 388 U.S. 1 (1967) (invalidating the last state ban on interracial marriage).

genetic, and gave rise to a natural social hierarchy. Even though race was becoming increasingly difficult to define, the Supreme Court continued to try to draw clear-cut racial boundaries, usually to the disadvantage of nonwhites.<sup>131</sup> The justices' reasoning and decisions amounted to implicit endorsements of eugenic ideas and helped perpetuate a social hierarchy that, according to the scientific experts, properly placed whites at the top, blacks at the bottom, and everyone else somewhere in the mysterious space between.

Even though the science behind eugenics has since been discredited, the distinct categories posited by race scientists have had a lasting impact on our understanding of race. Presently in the United States, five groups are recognized as the main races: African Americans, Asian Americans, European Americans, Hispanics or Latinos, and Native Americans.<sup>132</sup> Worldwide, Africans, Americans, Asians, Australians, Europeans, and Oceanians are perceived as the six dominant racial groups.<sup>133</sup> It is not coincidence that these contemporary divisions echo the taxonomies of the past.

### C. THE RISE OF CULTURAL ANTHROPOLOGY

By the mid-1900s, race science began falling apart. Eugenics, which had become so popular in America and Europe following World War I, quickly lost its appeal after it served as the foundation for the genocide of over six million Jews in Nazi Germany during World War II.<sup>134</sup> Furthermore, as scientists began to examine more traits of greater numbers of people from various parts of the globe, they realized they could not agree on any characteristics to reliably differentiate one race from the next.<sup>135</sup> On the contrary, developing research on human blood proteins and DNA revealed genetic variation to be gradual across people around the world, not discrete,<sup>136</sup> making it hard to fit individuals into five or six

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131. See *supra* note 102 and accompanying text. An older but prime example would be one-sixteenth statutes by which courts deemed a person Negro even if only one of his or her great-grandparents was black. GROSS, *supra* note 82, at 100–01. Informally known as the one-drop rule, qualifying as white under this law undoubtedly had social and legal benefits. Even in the twentieth century, whiteness had significant advantages, especially in matters of citizenship. Sundquist, *supra* note 86, at 246–48.

132. Richman, *supra* note 26, at 434.

133. *Id.* at 422.

134. Sundquist, *supra* note 17, at 64–65 (explaining that Adolf Hitler's plan to eliminate Jews was based on a belief that they constituted a "parasitic race," and that its purpose was to preserve the genetic superiority of Aryans).

135. Ossorio, *supra* note 31, at 279.

136. Ossorio & Duster, *supra* note 16, at 126.

rac<sup>137</sup> In fact, depending on the criteria used to demarcate racial categories, different researchers could divide humankind into anywhere from three to fifty races.<sup>138</sup>

Meanwhile, social scientists began speaking out against the proposition that race could be reduced to science and that it was indicative of personality, morality, intellect, and so on. Sociologists, social psychologists, and cultural anthropologists such as Franz Boas instead sought to analyze society and history in terms of culture, which they believed exerted greater influence on a person's development.<sup>139</sup> They recognized differences of individual character and capacity as the result of environment and circumstance, not simply race, and further argued—in accordance with the advancements of molecular science—that race was biologically unfounded.<sup>140</sup> To demonstrate their rejection of race science and eugenic ideas, some of these social scientists suggested eliminating the term “race” altogether.<sup>141</sup>

By casting genes out of the picture, cultural anthropologists also exposed the earlier theories of taxonomists and eugenicists as outcome oriented and thus fatally flawed. These cultural scholars criticized race scientists for using “seemingly unbiased and logical scientific procedures to verify pre-existing racial conclusions concerning black inferiority and white superiority.”<sup>142</sup> Because science had claimed to speak with an impartial, intellectual voice, it had been misused to give academic affirmation to folk notions of race and to sustain a racially tyrannical social structure.<sup>143</sup> But modern developments in biology clearly demonstrated that race science was a fiction—nothing but “scientific racism.”<sup>144</sup>

The courts as well began to recognize that race could not be tied to blood and that racial classifications had been used to perpetuate social inequality. For example, in *United States v. Thind*, the Supreme Court struggled to interpret the phrase “white persons” in a naturalization statute,

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137. Richman, *supra* note 26, at 392.

138. Ossorio & Duster, *supra* note 16, at 117; Richman, *supra* note 26, at 431. For a deeper look at the broader social and political impact of recent genetic discoveries, see TROY DUSTER, BACKDOOR TO EUGENICS (1990).

139. Pascoe, *supra* note 83, at 470. *See also* GROSS, *supra* note 82, at 228–29 (describing how Boas' work had a significant role in chipping away at race science).

140. Pascoe, *supra* note 83, at 470.

141. Sundquist, *supra* note 86, at 253.

142. *Id.* at 242.

143. Sundquist, *supra* note 17, at 59.

144. Rose M. Brewer, *Thinking Critically About Race and Genetics*, 34 J.L. MED. & ETHICS 513, 515–16 (2006).

and when it looked to biology, concluded that the findings of Linnaeus, Blumenbach, and like scientists stood “in irreconcilable disagreement” as to how to draw racial divisions.<sup>145</sup> Rather than articulate precise meaning or criteria to qualify as a member of the white race, the Court held that the determination ought to be left to “common understanding.”<sup>146</sup> Though the *Thind* decision did not explicitly criticize race science, it took a step in the right direction by admitting the ambiguous boundaries between racial categories and establishing membership in a race as flexible, not fixed. The same scientific incongruity was also observed by the courts in anti-miscegenation trials,<sup>147</sup> culminating in *Loving v. Virginia*, which declared bans on interracial marriage unconstitutional and noted (but left unaddressed) the contention that such laws were fueled by white supremacist motives.<sup>148</sup>

As it became clear that race was less of a concrete biological fact and more of an artificial social construction that engendered inequality, the legal system responded by invalidating anti-miscegenation laws and other race-based statutes on the grounds that they violated the Fourteenth Amendment’s Equal Protection Clause.<sup>149</sup> In the decades after *Brown v. Board of Education* decided that separate facilities were inherently unequal, the judicial trend was one of colorblindness: the courts reasoned that the proper way to combat racism was to make race a nonissue under the law, and that the best way to accomplish this was to remove race from the law altogether. Consequently, race-laden language more or less disappeared from legal discourse.<sup>150</sup> In the same spirit, facially race-neutral laws that nevertheless disadvantaged a certain race in their purpose or

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145. *United States v. Thind*, 261 U.S. 204, 208–09, 212 (1923).

146. *Id.* at 210. *See also supra* note 102.

147. *E.g.*, *Perez v. Lippold*, 198 P.2d 17, 27–28 (Cal. 1948) (marking the first state court decision to strike down a state miscegenation law and suggesting that Blumenbach’s “hard and fast classification” for race might be inapplicable even to an individual with no mixed ancestry). *See also* Pascoe, *supra* note 83, at 477 (highlighting “judicial willingness to believe in the biological indeterminacy of race” in *Perez*).

148. *Loving v. Virginia*, 388 U.S. 1, 11–12 & n.11 (1967) (acknowledging the possibility but stating that the Court did not need to decide whether the miscegenation law was designed to ensure “integrity of the white race”).

149. *E.g.*, *McLaughlin v. Florida*, 379 U.S. 184, 193–96 (1964) (striking down a Florida statute that punished interracial cohabitation more severely than intraracial cohabitation and suggesting, but not deciding, that the state’s interracial marriage ban was also invalid); *Brown v. Bd. of Educ.*, 347 U.S. 483, 495 (1954).

150. *Brown*, 347 U.S. at 495; Pascoe, *supra* note 83, at 482 (“In a society newly determined to be ‘color-blind,’ granting public recognition to racial categories seemed to be synonymous with racism itself.”). The colorblindness doctrine comes not from *Brown* but from *Plessy v. Ferguson*, 163 U.S. 537, 559 (1896) (Harlan, J., dissenting).

effect were stricken down as well.<sup>151</sup>

The erasure of racialized legislation reflected America's dying belief in race as a legally meaningful and biologically rooted phenomenon, as well as a willingness to acknowledge that racial categories had been created and abused largely for racist purposes. By deemphasizing race, the legal system endorsed the idea that race was unimportant insofar as it could be definitively coupled with an individual's personality, intellect, morality, or any of the other traits that race scientists had previously linked to racial groups. Race was not supposed to matter in an impartial court of law because it was not an accurate measure of a person's disposition, aptitude, or value. Race previously had enormous legal significance because it was thought to be natural, indicative of these characteristics, and influential on social structure—but now it could no longer be genetically tethered to important human differences.

In making colorblindness their guide, the courts sent the message that membership in a racial category revealed little (if anything) about individual character and capacity, and as a result, distinguishing race in the legal context is rarely necessary and highly suspect.<sup>152</sup> Because race was used for centuries to effect social hierarchy, the simple act of recognizing race was thought to open a dangerous door for racism to slink in and usurp the fairness that the law strived to ensure.

This progression from racial folktales to the race sciences that supposedly corroborated them, and finally to race as a social categorization devoid of any biological basis, brings us to our current understanding of race.

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151. *E.g.*, *Griggs v. Duke Power Co.*, 401 U.S. 424, 431–32 (1971) (holding that the Civil Rights Act of 1964 is violated when hiring practices favor whites without any business justification, even if the employer has no express discriminatory intent). *See also* *Arlington Heights v. Metro. Hous. Dev. Corp.*, 429 U.S. 252, 266–68 (1977) (naming factors to consider when determining whether a neutral law was enacted with a discriminatory purpose). The basic rationale behind these so-called disparate impact cases is that “[p]rivate biases may be outside the reach of the law, but the law cannot, directly or indirectly, give them effect.” *Palmore v. Sidoti*, 466 U.S. 429, 433 (1984).

152. *See* *Adarand Constructors v. Peña*, 515 U.S. 200, 227 (1995) (holding that all facial race classifications, whether enacted by federal, state, or local government agencies, are subject to strict scrutiny). Whether eliminating racial inequality is best served by colorblindness and strict scrutiny, or by a lesser degree of judicial review for race-conscious remedial legislation, is not a topic I tackle in this Note, as it divides even the Supreme Court. For some arguments on either side, see *Richmond v. J.A. Croson Co.*, 488 U.S. 469, 520–30, 551–53 (1989) (Scalia, J., concurring and Marshall, J., dissenting). *See also* GROSS, *supra* note 82, at 299–303.

## D. CURRENT CONCEPTIONS OF A SOCIAL CONSTRUCT

Today, race is understood to be a social and political construction—a manmade scheme of organizing human beings that we use to guide and interpret our social reality.<sup>153</sup> While there is no set definition of race,<sup>154</sup> scholars agree that race is “something that people create through social interactions. It is complex and mutable, created and recreated through the interplay of relationships, institutions and ideologies. . . . Races are not natural categories. Rather, race is a second-order construct fashioned out of people’s beliefs about what is natural and essential.”<sup>155</sup>

Our beliefs about race and whether a person “belongs” to a certain race involve complex, often subconscious judgments about variables including ancestry, nationality, language, behavior, attitudes, and phenotypic cues such as skin color and hair texture.<sup>156</sup> Because race depends on subjective interpretations of these different factors, and because those interpretations are often tied to one’s personal experience and context, race is not always clear cut or easily discernible. Rather, conceptions of race are “variable and fluid, changing over time and differing throughout the world.”<sup>157</sup>

Recognizing race as a social invention requires acknowledging that racial categories are not innate, either by virtue of some intangible essence or by genes. It also follows that races are not absolute, permanent, or mutually exclusive. Furthermore, if race is merely a social brand, it bears no relation to a person’s temperament, morality, or mental capability. Thus it is clear that the race-as-social-construct paradigm directly refutes racial folktales and race science. Indeed, evolutionary biologists, anthropologists, and scholars of other fields affirm that race distinctions “are not genetically

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153. Ossorio, *supra* note 31, at 278–79; Sundquist, *supra* note 86, at 232.

154. See Neil Gotanda, *A Critique of “Our Constitution is Color-Blind,”* 44 STAN. L. REV. 1 (1991) (describing how the Supreme Court employs four different definitions of race—status, formal, historical, and cultural—in its colorblindness opinions). Compare, e.g., KWAME ANTHONY APPIAH, *Illusions of Race*, in IN MY FATHER’S HOUSE: AFRICA IN THE PHILOSOPHY OF CULTURE 45 (1992) (contrasting biological and sociohistorical conceptions of race, and concluding that “[t]he truth is that there are no races: there is nothing in the world that can do all we ask race to do for us”) with Jayne Chong-Soon Lee, *Navigating the Topology of Race*, 46 STAN. L. REV. 747 (1994) (critiquing Appiah and arguing that race is appropriately understood as having multiple definitions).

155. Ossorio, *supra* note 31, at 279.

156. Sundquist, *supra* note 86, at 261.

157. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 13. See also Sundquist, *supra* note 86, at 263 (“An individual may be regarded as ‘white’ by some observers in the United States, while regarded as ‘black’ by other American observers. Location and context also matter greatly in racial categorization, as a person may be deemed to be black according to the social customs of London, but regarded as white in Sao Paulo.”).

discrete, are not reliably measured, and are not scientifically meaningful.”<sup>158</sup>

How then did racial designations become meaningful? And why do they persist absent a scientific basis? History helps answer these questions. Race emerged because the concept served to maintain power disparities, namely between propertied whites and enslaved blacks in early America.<sup>159</sup> Splitting humans into discrete categories enabled the allegedly superior majority to declare a natural social hierarchy, which constituted legal (among other levels of) justification for the unequal treatment of those they considered inferior.<sup>160</sup> Although the law has taken significant strides to remedy that divide, race continues to matter.<sup>161</sup>

To be clear, race is meaningful in the sense that it shapes an individual’s identity and everyday experiences. Race is important because it is inextricably part of America’s biography.<sup>162</sup> Though an artificial construct, race affects the way we treat one another—and the way the law has sometimes mistreated us. “The fact that the race concept has no basis in biology does not make it less real; in fact (willful) misunderstanding of the biology is one of the causes of much of the misery attendant on the history of the cultural phenomenon of race.”<sup>163</sup> The key question to ask when trying to understand race today is why race matters. We now realize that race matters not because it is a fixed, inexplicable essence as folk notions asserted, nor because it is controlled by genes and suggestive of a natural social pecking order, as eugenics claimed. Rather, race matters because, at the least, it is a social scheme that easily becomes a tool of oppression for both laymen and lawmakers.

The courts are well aware that racial labels are potentially subject to harmful abuse, as evidenced by the fact that they apply strict scrutiny to all explicit racial classifications and to cases in which racial discrimination is not express but appears to be at issue.<sup>164</sup> Continued adherence to

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158. Smedley & Smedley, *supra* note 82, at 16.

159. Sundquist, *supra* note 86, at 232. *See supra* text accompanying notes 89–93.

160. Sundquist, *supra* note 86, at 261.

161. Arguably, one reason racial distinctions exist is that they provide a convenient framework to process the social world: race is often thought to be salient and allows us to make generalizations about others (both knowingly and subconsciously). *See supra* text accompanying note 153. Thus, as long as people use racial categories to filter their social reality, even if not in an intentionally racist way, race will remain an important distinction. *See infra* text accompanying note 235.

162. *See* GROSS, *supra* note 82, at 298 (“Today our policies reflect this long and persistent history of making race a central part of U.S. law and citizenship.”).

163. Richman, *supra* note 26, at 390 (emphasis omitted).

164. *See supra* notes 150–51 and accompanying text.

colorblindness—the “deliberate nonrecognition” of race under the law whenever possible—has proven to be the judiciary’s preferred method of sidestepping discrimination.<sup>165</sup>

But because racial groups are now understood as being socially constructed, courts have had a difficult time conceptualizing race for the purposes of law. The Supreme Court rejected that race is a binary (black and white) distinction,<sup>166</sup> and it has acknowledged that language might sometimes be a proxy for race.<sup>167</sup> In the case of Native Americans, the justices have separated race from political status, allowing the law to take into account the latter.<sup>168</sup> However, the Court has never offered a concrete and comprehensive definition of race, and perhaps we should not expect it to, given that nobody else seems to be able to do so.<sup>169</sup>

Nevertheless, the Supreme Court has managed to settle on a description of race discrimination for the purpose of Equal Protection Clause claims: “that which singles out ‘identifiable classes of persons . . . solely because of their ancestry or ethnic characteristics.’”<sup>170</sup> By this articulation, the legal system recognizes that, as nebulous as race may be, at the least it has ancestral and phenotypic components.<sup>171</sup> This message comports with the academic understanding of race as a social phenomenon molded by several variables.<sup>172</sup>

But it is also true that, independent of any associations with race, ancestry and phenotype each have significance in the field of biology. Specifically, genetic similarity correlates with proximate geographic origin,

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165. Pascoe, *supra* note 83, at 482. *See also supra* note 152 and accompanying text.

166. *See Hernandez v. Texas*, 347 U.S. 475, 479–80 (1954) (holding that, according to community attitudes, “persons of Mexican descent constitute a separate class” distinct from whites and blacks, and their systemic exclusion from juries therefore amounted to unconstitutional discrimination). Note, however, that this opinion did not necessarily name persons of Mexican descent as a separate racial classification.

167. *Hernandez v. New York*, 500 U.S. 352, 371 (1991) (“It may be, for certain ethnic groups and in some communities, that proficiency in a particular language . . . should be treated as a surrogate for race under an equal protection analysis.”).

168. *Morton v. Mancari*, 417 U.S. 535, 554 (1974) (holding that employment preferences for “qualified Indians” were constitutional because the preferences were political—available to “Indians not as a discrete racial group, but, rather, as members of quasi-sovereign tribal entities”—even though qualification required a blood quantum).

169. *See supra* note 154 and accompanying text.

170. *Rice v. Cayetano*, 528 U.S. 495, 515 (2000) (quoting *Saint Francis Coll. v. Al-Khazraji*, 481 U.S. 604, 613 (1987)).

171. The Supreme Court has named distinct physiognomy (physical appearance) as a sufficient but not necessary basis for racial discrimination. *Saint Francis Coll.*, 481 U.S. at 613.

172. *See supra* notes 156–57 and accompanying text.

and physical traits are partly genetic.<sup>173</sup> If the biological dimension of these components is yanked into discussions about their role in creating race, genetic science can muddle the source of racial categorizations. This is precisely the danger in using DNA to ascertain a perpetrator's race in the context of criminal investigations.

#### IV. PROBLEMS WITH DNA-BASED RACE DETERMINATIONS

Using DNA profiles for law enforcement purposes has several potential benefits. For example, DNA databases can speed up criminal investigations and reduce their costs, allow officers to rule out innocent suspects, and increase the reliability of evidence that may later be introduced at trial.<sup>174</sup> However, these advantages exist because the science supporting DNA profiling and the methods through which it is implemented are sound—and they must remain so for the system to function fairly and dependably. In light of what we know about the relationship (or more accurately, the lack thereof) between genetics and race, inferring race from DNA is nonsensical at best. Race determinations based on DNA have no reliable scientific basis, and their use in criminal investigations invites a host of unwanted consequences.

##### A. AIMS ARBITRARILY SLICE A PHENOTYPIC CONTINUUM

Using AIMS as the starting point for DNA-based race predictions is flawed because doing so reduces race to a matter of biologically based physical traits. Recall that the 176 genetic markers examined by DNAWitness were specifically chosen because they reveal the most information about a person's physical characteristics.<sup>175</sup> It is true that genes affect phenotype and that phenotype has some relation to race. But race is a categorization involving much more than physical traits,<sup>176</sup> and indeed, a person's AIMS and morphology may lead to contradicting conclusions about race.<sup>177</sup> Furthermore, the physical cues associated with race—for

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173. See *supra* notes 22, 69–77 and accompanying text. Though physical cues for race, such as skin color, eye color, and hair color and texture are partially controlled by genes, scientists have not found a definitive relationship between certain alleles and any variants of these phenotypic characteristics. See *infra* notes 192–95 and accompanying text.

174. Williams & Johnson, *supra* note 36, at 235.

175. See *supra* text accompanying note 6.

176. See *supra* text accompanying notes 33–35.

177. Ossorio, *supra* note 31, at 283 (explaining how a Brazil study found that approximately one fourth of individuals categorized as “definitely white” by visual assessment had 50 percent or more African or Native American ancestry according to genetic tests, and several individuals perceived as black because of their physical appearance had some European ancestry). See also *infra* text

example, skin color, hair texture, and facial features—are themselves socially selected and can vary with time, place, context, and individual experience.<sup>178</sup> To use AIMs to infer race is actually to predict physical traits from genetics, then to presume that certain phenotypes correspond to racial groups. This process oversimplifies race, making it a question of physical appearance alone.

When scientists use AIMs to approximate ancestry and then deliver a conclusion about a suspect's race, they attempt to cut distinct ancestral and ultimately racial categories out of what is really a continuum of phenotypes.<sup>179</sup> Based on current research, we know that humans' genetic variation—and the physical traits used as markers for race—exist along an uninterrupted range throughout the world.<sup>180</sup> The human genome and the physical features encoded therein cannot be dissected to split human beings into distinct ancestral or racial groups.<sup>181</sup>

There exist no genetic markers possessed by all members of one race but no others,<sup>182</sup> and there is no morphological trait present in all people of a race but absent from all other races.<sup>183</sup> The association between a certain hair, eye, or skin color and race is based not on absolute occurrences but on relative frequencies of these characteristics, which throughout history have collected racial content.<sup>184</sup> Phenotypic differences are real and have some basis in genetics, but the traits used to distinguish race are socially selected and flexible, as are their racial assignments, and they do not make discrete appearances in people of a certain race but not others.<sup>185</sup>

This continuum of phenotypic differences is the result of adaptive evolution. In order to survive in varying environments, populations in different geographic areas gradually developed morphological traits best

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accompanying note 214.

178. Haga, *supra* note 56, at 59. *See also supra* text accompanying notes 156–57.

179. *See infra* Part IV.B.1 (regarding the geography-oriented clusters at the heart of ancestry inferences).

180. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 12–13. *See also infra* text accompanying notes 203–04.

181. *See* Richman, *supra* note 26, at 431 (analogizing the continuity of human variation to liquid and explaining that “in the end, it is a fool’s errand [to distinguish discrete races]; you cannot slice soup. No matter where you make the cuts and no matter how many cuts you make, it is still soup.”).

182. Ossorio, *supra* note 31, at 280 (“Human genetic variation ‘ . . . tends to be distributed in a continuous, overlapping fashion among populations.’” (quoting Lynn B. Jorde & Stephen P. Wooding, *Genetic Variation, Classification and “Race,”* in 36 *NATURE GENETICS* S28, S28 (Supp. 2004), available at [http://www.genetics.wustl.edu/bio5488/papers\\_2005/jorde.pdf](http://www.genetics.wustl.edu/bio5488/papers_2005/jorde.pdf)).

183. Richman, *supra* note 26, at 428.

184. *Id.* at 429.

185. *See supra* text accompanying notes 153–57.

suites to survival under the conditions of their respective regions.<sup>186</sup> And because external factors procure the adaptations, like phenotypes do not necessarily indicate like genotypes. People whose genes point to dissimilar ancestry may nevertheless exhibit common physical traits if they have been exposed to the same or similar environments.<sup>187</sup> Thus “[g]enetic ancestry information does not always provide a strong basis for inferring morphology, and conversely, morphology does not always support reliable inferences about ancestry.”<sup>188</sup>

To assert that high numbers of certain AIMs place an individual into one racial category or another is to fit him or her into an artificial box. It requires that whoever assesses the frequency of these genetic markers has made a subjective decision about, for example, how light skin must be in order for a person to be white.<sup>189</sup> It is an “attempt to pigeonhole the clinal pattern of human variation into a discrete set of races [which] forces purely arbitrary decisions about where in the continua to draw the lines.”<sup>190</sup> The diversity of phenotypes exhibited by human beings cannot be partitioned in a scientific, objective way that yields racial categories. Yet this is what happens when AIMs are used to determine race. The prediction boils race down to physical traits and attempts to parse a spectrum of phenotypic variation into separate groups.

Another reason racial profiles based on AIMs deserve skepticism is that the analysis reviews fewer than two hundred markers, a slight portion of the three billion nucleotides comprising the whole human genome. How do we know this number of markers is sufficient to determine ancestry, and subsequently, race? We may never.<sup>191</sup> How do we know that the AIMs used are the ones that ultimately paint the most accurate picture of a

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186. *E.g.*, Haga, *supra* note 56, at 61 (explaining that in addition to genetics, light, temperature, nutrition, and hormone levels can affect hair growth rate, texture, color, and shape); Richman, *supra* note 26, at 429 (offering the example that dark skin and small size are advantageous in tropical zones because they minimize heat creation and maximize heat dispersion).

187. Richman, *supra* note 26, at 429. This evolutionary phenomenon, known as convergence, is responsible for the similar body designs of sharks and dolphins despite the fact that they are phylogenically distant—the former is a fish, and the latter, a mammal, but both had to adapt to the marine environment. *Id.* at 430.

188. Ossorio, *supra* note 31, at 283. *See also infra* note 217 and accompanying text.

189. *E.g.*, Naik, *supra* note 78 (“[T]he conclusion can be ambiguous or unhelpful. ‘What does it mean to say that the DNA belongs to a “light-skinned black man”? It’s a subjective interpretation.”).

190. Richman, *supra* note 26, at 430–31.

191. Ossorio, *supra* note 31, at 282 (“Genetic ancestry tracing will never be complete or comprehensive, even if geneticists examine markers on all of a person’s chromosomes, including the twenty-two autosomes. Some genetic information is lost when chromosomes are transmitted from one generation to the next. . . . Interestingly, full siblings will not necessarily have identical genetic ancestry.”).

person's race? We don't. The AIMs tested by DNAWitness allegedly reveal more about physical traits than any other genetic markers do. This might be true, but it might also be irrelevant—or even undesirable—since inferring race from phenotype alone is inappropriate. In any case, it is only a claim of relative significance. The alleged comprehensiveness of these AIMs is hard to reconcile with geneticists' admitted inability to identify exactly how many and which genes account for physical features that are commonly given racial significance.

For example, skin and eye color are known to be controlled largely by the pigment melanin.<sup>192</sup> While we know that melanin production involves several genes, scientists have not established that certain alleles are guaranteed to produce blond, brown, or black hair and so on; instead, they have only identified associations between gene variants and certain skin and hair shades, which do not even hold true in all cases.<sup>193</sup> Similarly, while some chromosomal regions have been linked to lighter eye colors, researches can only estimate that a person is more or less likely to have blue or gray irises, not compute exact figures.<sup>194</sup> Likewise, we know several genes have an effect on hair texture and color, but little is known about hair's biological basis beyond that.<sup>195</sup>

In sum, counting AIMs to infer ancestry and ultimately race is improper because it requires guessing about the dispersion of AIMs and the significance of the markers:

[G]enetic tests do not yield complete or completely authoritative determinations [because] scientists make many judgment calls and assumptions when designing the tests. Scientists must decide which genetic markers to evaluate, how many markers to evaluate, and what reference populations will be used . . . . Test design also incorporates assumptions about migration rates, migration patterns, and reproductive practices throughout all of human history.<sup>196</sup>

Using DNA to predict ancestry to predict race mistakenly treats ancestry and racial identity as questions of physical characteristics, when in reality, “the relationships among ancestry, race, and morphology are

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192. Haga, *supra* note 56, at 60.

193. *Id.* at 60–61 (referring to statistics for variants of a gene called MC1R that have been linked to fair skin and red hair, and variants of gene SLC24A5 that have some relation to lighter skin color).

194. *Id.* at 61 (citing studies that loosely link chromosomes 15 and 19 to blue or brown and blue or gray eye color, respectively).

195. *Id.* at 61–62 (“Current understanding of genetic polymorphisms linked to hair color, structure, or alopecia (hair loss) is weak.”).

196. Ossorio, *supra* note 31, at 282.

complex and fluid.”<sup>197</sup> Moreover, determining race from AIMs involves subjective judgments—drawing boundaries across a phenotypic continuum that cannot be divided discretely without guesstimates. Physical traits play a role in race, but race cannot be reduced to a matter of relative frequencies of genetic markers that affect phenotype. Of course we hope that “technology, through its mechanical reproducibility, will be impervious to context and will provide unbiased and reliable evidence about the facts of the matter. Human actions, however, can never be entirely ruled out of the picture,” and this is why using AIMs to deduce race results in arbitrary or ambiguous outcomes.<sup>198</sup>

## B. ASSUMPTIVE METHODOLOGIES

Determining race from DNA requires two layers of inferences: AIMs are first used to trace a person’s ancestry (geographic origin), and based on that ancestry finding, researchers then make an inference as to his or her race.<sup>199</sup> This process is problematic at both junctures. First, the AIMs analysis used to deduce ancestry is not cut and dried. The genetic science is applicable only in limited cases, and the results are varying and inexact. Second, while ancestry is an important component of race, the two are different concepts. They do not correlate perfectly, and jumping to conclusions about race from ancestry blurs the distinction between the two in a way that could make the race prediction erroneous.

### 1. Using AIMs to Speculate Ancestry

DNA-based ancestry findings have their basis in theories about ancient human migration patterns, specifically the notion that geographically close populations exhibit more genetic similarity than those groups that are farther away from one another.<sup>200</sup> In line with this idea, studies consistently demonstrate that when people are arranged according to the relative frequencies of specific AIMs in their DNA, they can be clustered into four to six groups that roughly correspond to continents.<sup>201</sup> In addition, the clusters bear some resemblance to what many people consider the major racial categories around the world, namely Africans, Caucasians, East Asians, Native Americans, and Pacific Islanders.<sup>202</sup>

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197. *Id.* at 283.

198. Jasanoff, *supra* note 30, at 330.

199. *See* Ossorio, *supra* note 31, at 281.

200. *See supra* notes 74–77 and accompanying text.

201. Haga, *supra* note 56, at 58; Richman, *supra* note 26, at 436–37.

202. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 12.

These clusters, however, are imprecise. Their margins are hazy, and rather than providing clear-cut biological boundaries to differentiate ancestral groups, they reveal that all humans fall on the same uninterrupted gradient of genetic variation.<sup>203</sup> The number and distinctiveness of the clusters can vary with sampling methods; the end result may not be continent-associated groups at all but one continuous band of genetic variability spread across different geographic regions.<sup>204</sup>

Interestingly, when scientists invert the criterion and organize individuals into populations according to geographic location, they have found that approximately 93 to 95 percent of human genetic differences are found in a single population, and the remaining 5 to 7 percent are found between them.<sup>205</sup> In other words, most genetic diversity occurs within any one group of people, not among them, drawing into question the significance of the clustering technique.

Moreover, the continental clustering has limited application. Because the clusters are a function of genetic variability among populations of different regions, a person cannot be readily fit into a cluster unless he or she has recent ancestors all from a single geographic area, which is less commonly the case as humans intermix and reproduce with others from various parts of the world.<sup>206</sup> When individuals come from a region where once geographically distinct populations have mingled genetically (that is, reproduced), their AIMs are likely to paint an indeterminate sketch of their roots, and assigning them to an ancestral cluster requires increased speculation.<sup>207</sup>

Given the unreliability of the clustering technique, scholars ultimately agree that “[a]lthough a tiny fraction of human genetic variation can be used to make statistical claims about a person’s recent ancestral origins, most genetic markers will not distinguish continent of ancestry at all,” giving little credence to AIMs-based ancestry predictions.<sup>208</sup> The clusters

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203. Richman, *supra* note 26, at 442.

204. *Id.* at 438.

205. Haga, *supra* note 56, at 58. *See also* Richman, *supra* note 26, at 425–27 (contrasting intra- and intergroup variation and calculating that 0.007 percent of genetic differences can be attributable to continental race).

206. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 12. Indeed, human genetic diversity reached its peak some 14,000 years ago and has been decreasing ever since. *See infra* note 221.

207. Haga, *supra* note 56, at 59 (offering the example that “many individuals from countries in Central America and the Caribbean have a three-part heritage: Native American, European, and African”).

208. Ossorio & Duster, *supra* note 16, at 118. Contrast the doubtful quality of ancestry determinations against the certitude with which DNA identifications are made. *See supra* text accompanying note 55. Does it make sense for our criminal justice system to require utmost certainty

are real, but they represent nothing more than “a statistical summary of the gross spatial distribution of human genetic variation,” and their existence can be attributed to the simple, undisputed fact that human beings historically reproduced and shared DNA with those nearby, which over tens of thousands of years resulted in similar genetic material among individuals in close proximity.<sup>209</sup>

AIMs analyses can be used to create ancestry groups, but these groups neither match squarely with races nor do they support a biological basis for race.<sup>210</sup> Nevertheless, these ancestry estimations then become the foundation for inferences about race.

## 2. Ancestry and Race Conflated

Although the same clusters that were shown to be continent oriented also bear loose resemblance to racial categories,<sup>211</sup> ancestry and race are not the same.<sup>212</sup> While persons with common geographic origins are often considered to belong to the same race, this is rarely because of ancestry alone. Other cues that feed into racial identity, such as similar phenotypic features and a common language, are almost always at play as well, and these variables are logically explained by human beings’ tendency to mate with those similar to them and who share a language.<sup>213</sup> Ancestry is just one of many factors used to designate race—and not always a reliable one because individuals with similar geographical ancestry proportions may nevertheless identify with different races.<sup>214</sup> Importantly, “[a]ncestry informative genetic markers do not carry racial essences, because people of

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for DNA matches but not when using DNA to predict race?

209. Richman, *supra* note 26, at 442–43 (clarifying that “[r]ace is a social construct, but the clusters are real *biologically*; their ‘reality’ consists in their ability to capture, accurately but at low resolution, about half of the 15% of human genetic variation that can be attributed to geography”).

210. *Id.* at 389, 439–44. *See also* Brewer, *supra* note 144, at 515 (explaining that recent advances in molecular genetics present “the temptation to treat [ancestral] populations as genetically distinct, biologically defined racial groups”).

211. *See supra* text accompanying notes 201–02.

212. The Supreme Court itself has distinguished ancestry and race, noting their relation and ruling it unconstitutional to treat ancestry as a proxy for race. *Rice v. Cayetano*, 528 U.S. 495, 496 (2000) (holding that voting eligibility requirements violated the Fifteenth Amendment because the terms “Hawaiian” and “native Hawaiian” as defined by state statute “used ancestry as a racial definition and for a racial purpose”).

213. Richman, *supra* note 26, at 442–43 (explaining how “isolation by distance” results in nonrandom reproduction).

214. Jennifer K. Wagner, *Just the Facts, Ma’am: Removing the Drama from DNA Dragnets*, 11 N.C. J.L. & TECH. 51, 84 (2009). *See also* Ossorio, *supra* note 31, at 283 (“Inferring race from ancestry is as problematic or more problematic than inferring morphology, because race is based on more characteristics than morphology or ancestry.”).

the same race and quite similar geographic ancestry can have different variants at any particular ancestry informative site in the DNA.”<sup>215</sup>

The distinction between ancestry and race becomes sharper when the two do not match. Genetic data indicating ancestry sometimes contradicts an individual’s self- or other-identified race.<sup>216</sup> This incongruity is not surprising, given the fallibility of DNA-based ancestry analyses. When such a discrepancy exists, it can have disastrous effects on criminal investigations because the ancestry prediction may send officials hunting for a suspect of the “wrong” race:

[S]ome percentage of people who look White will possess genetic markers indicating that a significant majority of their recent ancestors were African. Some percentage of people . . . who look Black will possess genetic markers indicating that the majority of their recent ancestors were European. Native Americans may be genetically indistinguishable from Hispanics (Mexican Americans) or African Americans. Inferring race from genetic ancestry may mislead police rather than illuminate their search for a suspect.<sup>217</sup>

The pitfalls here should be obvious. When AIMs analysis yields an ancestry profile that differs from the perpetrator’s race as perceived by law enforcement officials, they spend time looking at persons who don’t fit the suspect profile, wasting resources and possibly subjecting innocent people to unnecessary investigations because of misplaced suspicions.<sup>218</sup> Meanwhile, the real offender remains at large, excluded from the search because he or she is not perceived as belonging to the race inferred from the DNA.

Trying to solve crimes using indefinite conjectures is neither efficient nor sensible—but this is the science of DNA-based race determinations. Race is used as “a surrogate for ancestral geographic origin, which is a surrogate for variation across the genome.”<sup>219</sup> It is a prediction built on a duo of approximations: one uses a tiny fraction of human genetic material

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215. Ossorio & Duster, *supra* note 16, at 119.

216. Haga, *supra* note 56, at 59 (“The individual’s place of residence, where they were raised, and culture will certainly influence the race they self-identify with which cannot be revealed through DNA analysis.”); Ossorio & Duster, *supra* note 16, at 126 (stating that a person’s genes “can provide some information about ancestry, but ancestry may or may not correlate well with a person’s race”).

217. Ossorio & Duster, *supra* note 16, at 121. *See id.* at 118 (“[A]ncestry does not always correlate with other indicia of race. People whose skin color is perceived as white can have genetic profiles indicating that 80% of their recent ancestry is West African, and people whose skin color is perceived as black can have genetic profiles indicative of predominately European ancestry.”).

218. *See infra* Part IV.D for discussion of how this occurs in investigations that use DNA dragnets.

219. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 13.

to estimate ancestry, and the other uses ancestry to speculate about race. The first analysis has limited applicability and reliability, and the second requires the assumption that ancestry and race are the same, or at least sufficiently similar, to leap from the former to the latter—and possibly launch a criminal investigation against someone who the police might otherwise have no reason to suspect.

Even supposing that scientists could use DNA to infer race with near-perfect accuracy at present,<sup>220</sup> this begs a line-drawing question for future use. As transportation advances, travel becomes more affordable and common, increasing global migration. Consequently, people with different geographic roots will mix and reproduce, evening out the now varying frequencies of AIMs and making clusters even more difficult, if not impossible, to form.<sup>221</sup> This may take decades or centuries, but one must still ask whether race predictions should be trusted if they were correct in 98 percent, 97 percent, etc. of cases. For example, no law enforcement agency would rely on findings that correctly identified a suspect's race only half the time. DNA-based race predictions already involve substantial "guesswork," and this will only continue to be the case more often as time passes.<sup>222</sup> Where will we draw the line?

The answer is that we should never have to. DNA should not be used to deduce race because the methods are imprecise. Though genetic variability exists and the link between AIMs and ancestry is real, this relation is tenuous. Though ancestry has a role in creating race, their association is approximate. Genetic variation "can correlate with ancestral geographic origin, but this correlation is far from perfect. Ancestral geographic origins, in turn, correlate to some degree with self-identified race or ethnicity, but . . . this relationship is blurry and context dependent."<sup>223</sup> It makes no sense for the legal system to require

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220. See *supra* text accompanying note 7 (stating that Frudakis claimed DNAWitness was 99 percent accurate). One might point out that although Frudakis' technology may not have been perfect, it was accurate enough to help apprehend the Baton Rouge serial killer. Yet it should be noted that the case against Lee was ultimately solved not by DNAWitness, but by other evidence. Sundquist, *supra* note 86, at 258. Furthermore, considering that literally millions of criminal investigations involve DNA evidence and that this number will inevitably continue to grow, even a genetic test that is 99 percent accurate will, mathematically speaking, yield tens of thousands—one day, perhaps hundreds of thousands—of incorrect race predictions. See *supra* notes 47–48 and accompanying text.

221. See Richman, *supra* note 26, at 412 (stating that humankind reached maximum genetic diversity some 14,000 years ago and that "[t]he last 14,000 years have seen a steady diminution in human genetic diversity caused by population consolidations, technological developments, wars, conquests, nation-founding, colonizations, epidemics, localized extinctions, and slave trading").

222. Haga, *supra* note 56, at 59.

223. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 13.

mathematical certainty when using DNA for other forensic purposes (such as making a match through CODIS) or as evidence at trial, but to then tolerate ballpark figures in the earlier stages of a criminal investigation, when the risk that individuals' constitutional rights will be violated is the same, if not greater.<sup>224</sup>

Furthermore, there are social consequences to consider if the science is accepted. If these methods are utilized by law enforcement, it could perpetuate the falsity that DNA can be trusted to reveal a person's race.<sup>225</sup> These suspect profiles would fall into the lap of a society that holds a "conviction that science can deliver failsafe, and therefore just, legal outcomes where the law, acting on its own, might fall short."<sup>226</sup> But proceeding with criminal investigations using DNA-based race predictions is a step backward toward race science, as both wrongly encourage the belief that genes encode race. As with eugenics, the public's deep reliance on modern technology will have destructive consequences for its perception of race. Though the intention of apprehending suspects is good, "[p]rocesses designed to meet the law's primary imperatives are not necessarily well suited to discriminating between good and bad scientific claims."<sup>227</sup> Because of dubious methods and regressive effects on social understanding, DNA is an improper basis for inferring suspects' race.

### C. PERPETUATING RACIAL INJUSTICE

Conducting criminal investigations with the aid of DNA-based race determinations is also detrimental because the use of racial suspect descriptions creates a greater opportunity for stereotypes about race and crime to be reinforced.<sup>228</sup> Specifically, there is serious concern that when

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224. See *supra* note 17 and text accompanying note 55. This topic is further discussed in Part IV.D.

225. Haga, *supra* note 56, at 64.

226. Jasanoff, *supra* note 30, at 328.

227. *Id.* at 329. See also *infra* note 239 and accompanying text for discussion about the normative pressures that sometimes lead law enforcement officials to make improper judgment calls on the job.

228. At least one author has argued that inferring race from genes does not in fact threaten to perpetuate stereotypes about race, saying that the DNA profiles are not pre-established but will indicate one race or another without prejudice. Kaye, *supra* note 25, at 418–19. This argument, however, fails to grasp that the concern about stereotypes is not so much that the technology is imprecise in a racist way (Kaye admits its inaccuracy—that it involves “imperfectly correlated” categories and that AIMs are only “roughly indicative of physical features”), nor that the genetic tests will be carried out by racist analysts seeking to frame one race over another. *Id.* at 419.

Instead, the worry is that the mere existence of a profile containing a racial description will make race an unnecessarily salient dimension of suspect identity and propagate stereotypes about race's connection to criminality. It is merely generating and relying on these profiles that scholars find undesirable. See, e.g., R. Richard Banks, *Race-Based Suspect Selection and Colorblind Equal*

criminal profiles identify a suspect by his or her race, if the perpetrator is a member of a minority race, these profiles will spread the stereotype that minorities are more likely to engage in criminal behavior and be violent or dangerous to society.<sup>229</sup> Moreover, when racial profiles are touted as infallible because they are backed by genetic expertise, there is a heightened risk that the stereotypes built atop them will be given especially great credence—when in reality, the science is not credible.

Stereotypes about a connection between racial identity and criminal behavior have been longstanding and powerful in the United States.<sup>230</sup> Folk notions of race and race sciences alike concluded that race was indicative of an individual's moral capacity and could be used to explain behavior.<sup>231</sup> White races, considered the superior stock, were the least likely to engage in criminal activity, and blacks, who were cast lowest on the social hierarchy, harbored a genetic proclivity for lawbreaking.<sup>232</sup> Many researchers assert that this historical bias against minorities is a significant (though not necessarily the sole) explanatory variable behind the imbalanced racial composition of persons in the modern-day criminal justice system.<sup>233</sup>

Why is race singled out as a causal factor for stereotypes such as this one? Why is criminality not associated with other variables, such as education or income level? If there is a simple answer to this line of

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*Protection Doctrine and Discourse*, 48 UCLA L. REV. 1075, 1075 (2001) (questioning why race is included in physical descriptions of perpetrators and arguing that “law enforcement use of race-based suspect descriptions is as much of a racial classification as is racial profiling”). See generally Bela August Walker, Note, *The Color of Crime: The Case Against Race-Based Suspect Descriptions*, 103 COLUM. L. REV. 662 (2003).

Other scholars who support DNA-based racial profiling, particularly those in Europe who seem to view themselves as belonging to a post-racial society, dismiss the risk of discrimination and prejudice as a danger specific to the United States. See, e.g., Koops & Schellekens, *supra* note 79, at 192. They acknowledge that predicting race from DNA “involves a certain risk of reinforcing racial prejudice” but assert that “[t]his risk is not large enough, however, to prohibit outright forensic phenotyping on ethnic origin (although opinions on this might differ between, for instance, in the United States and European countries).” *Id.* at 195. Race is arguably a more salient issue in the United States than it is in other countries. See *infra* notes 234–35 and accompanying text. But this fact may be attributed to America's unique racial diversity. The absence of a similar race consciousness in Europe does not necessarily reflect that a solution has already been found; it may indicate that the same consciousness has not yet arisen, or not to the extent that it has in the United States.

229. Ossorio, *supra* note 31, at 285 (pointing out “the possibility that forensic genetic profiles that include racial descriptions or racialized language will reinforce or recreate stereotypes of minorities as dangerous, criminal and morally inferior”).

230. *Id.* at 285–86 & nn.104–06.

231. See *supra* Parts III.A and III.B.

232. See *supra* text accompanying note 108.

233. See *supra* note 16 and accompanying text.

inquiry, it is that race is a salient categorization, perhaps more so than any other social scheme. Because racial groups are for the most part built on easily perceivable cues—physical appearance and language, for example—race allows us to essentialize and operate within our social reality with ease.<sup>234</sup> In America in particular, race was historically and still is deeply ingrained in our personal identities and social institutions, and we use racial designations to make rapid assumptions about a person's social status, social behavior, and social ranking,<sup>235</sup> often without being conscious of these judgments. Because race is so readily discerned and important, it has been shuffled to the front of the line as a convenient platform for stereotypes.

The danger of constructing DNA-based racial descriptions of suspects is therefore twofold: First, the use of these suspect profiles invites the public to continue believing that race is somehow causally related to criminal capacity.<sup>236</sup> Second, because the science purports that race can be divined through biology, it encourages the belief that persons of a certain race are genetically inclined to be criminal.<sup>237</sup> These hazards are a reflection of genetic reductionism, a tendency to “reduce complex behavior to measurable [and testable] biological dimensions” stemming from a desire to find genetic causes for human behavior.<sup>238</sup> Neither proposition is true, but both could disseminate harmful stereotypes about race—stereotypes that are unsupported by genetic research and that more than a half-century of scholarship in the social sciences has fought to quash.

Despite the greater goal of solving crime,<sup>239</sup> the legal system would do

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234. Smedley & Smedley, *supra* note 82, at 22. *See also supra* text accompanying note 153–55. This Note does not discuss the psychological and evolutionary explanations for why essentializing is an important adaptive function.

235. Smedley & Smedley, *supra* note 82, at 22 (noting that race “distorts, exaggerates, and maximizes human differences; it is the most extreme form of difference that humans can assert about another human being or group”).

236. Ossorio, *supra* note 31, at 286 (explaining research that race-laden language makes race more salient and triggers stereotypes that affect our judgment without us even realizing it, and citing a study in which use of the terms “white people” and “black people” as opposed to just “people” activated negative stereotypes).

237. *Id.* (“The strong existing linkage of crime and race could be further reinforced by adding genetics into the mix, given that folk notions conceptualize race as an inherent, possibly genetic, characteristic of persons.”).

238. Jasanoff, *supra* note 30, at 330, 338 (quoting DOROTHY NELKIN & LAURENCE R. TANCREDI, DANGEROUS DIAGNOSTICS: THE SOCIAL POWER OF BIOLOGICAL INFORMATION 10 (1989)).

239. Law enforcement agencies likely exert more pressure on their employees to close investigations than the public realizes. *See* Jasanoff, *supra* note 30, at 335–36 (acknowledging that lab technicians often feel compelled “to produce quick and conclusive results despite muddled evidence,” and discussing over two dozen cases in which law enforcement officials faked forensic evidence because the pressure to arrest a perpetrator was so great). Thankfully, evidence fabrication is not the

a disservice to the public by employing DNA to construct race profiles of suspects because of the stereotypes about biology, race, and criminality it could generate and preserve. Especially when dealing with the topic of race, we must “remain wary of the abuses of the past and the potential for genomic research to harm those who have historically been most vulnerable.”<sup>240</sup>

#### D. PERSONAL PRIVACY CONCERNS

A final reason DNA-based race determinations are improper for use in criminal investigations is that the use of these profiles threatens to tread on individual rights in massive numbers, and perhaps accidentally (and therefore, unnecessarily) so. This occurs when, after a description of the suspect’s race is generated based on DNA collected from a crime scene, law enforcement officials employ a dragnet to apprehend the perpetrator on the basis of that profile.<sup>241</sup>

Law enforcement agencies in the United States do not use DNA dragnets often, mostly because of their low success rate and high costs. These sweeps are more of a last resort when other evidence leaves investigators at a dead end.<sup>242</sup> Nevertheless, scholars have made noteworthy observations about the few dragnets that police have employed, citing them as problematic for two main reasons: First, the target population caught in these dragnets is usually comprised of individuals of a single racial group—often a minority.<sup>243</sup> Second, though participation in a dragnet is voluntary (people are asked to consent to giving the DNA sample), they make that “voluntary” decision under the pressure of the police on their doorstep, likely fearing worse, more intrusive consequences if they refuse to cooperate with the request.<sup>244</sup>

Dragnets are known for their racialized character.<sup>245</sup> Granted, this

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norm. Nevertheless, in a society that has long associated minorities with a propensity for lawbreaking, that pressure can be ripe soil for stereotypes when DNA is used to build racial profiles.

240. Bonham, Warshauer-Baker & Collins, *supra* note 33, at 14.

241. *See supra* Part II.E for general information about dragnets.

242. *See supra* text accompanying notes 60, 64–66.

243. Rothstein & Talbott, *supra* note 43, at 156.

244. *Id.* (explaining that when people refused to participate in a DNA dragnet in Oklahoma in 2001, law enforcement officials subsequently served them with search warrants and treated them as suspects).

245. Ossorio & Duster, *supra* note 16, at 122–23 (describing DNA dragnets in San Diego, California, and Ann Arbor, Michigan, which targeted black males; as with the Baton Rouge serial killer, the suspects in these cases were ultimately caught and convicted because of other evidence). The most obvious explanation for this is that race is a salient and easy schema to use to classify people. *See supra*

does not necessarily mean that they are conducted with racist motives. Dragnets are not carried out at whim against one or some races and not others; the sample population for a dragnet is usually selected based on an eyewitness's description of the perpetrator, which is likely to include race.<sup>246</sup> But because dragnets have a tendency to target minorities, and because of the large numbers of people they involve, they have enormous potential to perpetuate belief in a link between race and crime, in particular the stereotype that being of a minority race makes an individual criminal, violent, or morally inferior.<sup>247</sup>

Furthermore, if the initial evidence used to select a sample population for a DNA dragnet is flawed—for example, if a witness's description of the suspect's race is inaccurate—it may lead police to mistakenly target persons of the “wrong” race for their dragnet.<sup>248</sup> We hope that eyewitnesses are truthful and reliable, but their perceptions, memory, and personal biases often shape their suspect descriptions. This was exactly what happened with the search for the Baton Rouge serial killer.<sup>249</sup> The perpetrator's race was misidentified, and as a result, valuable law enforcement resources went to waste on a dragnet that pulled over a thousand innocent people into the criminal investigation—people who were of a different race than the actual perpetrator.

The risk of such error is even greater if DNA-based race determinations are used as the guide for choosing dragnet sample populations. Like an eyewitness who is not completely sure of what he or she saw, the methodology behind these racial profiles involves assumptions and guesswork,<sup>250</sup> and they are not guaranteed to be correct. It is irrational enough for law enforcement agencies to rely on DNA-based race predictions when investigating a single or a small number of suspects; it makes even less sense to invest in a dragnet on this basis, as dragnets carry startling price tags and intrude on the lives of hundreds or thousands of people.

The individual rights argument against dragnets is relatively straightforward: conducting dragnets violates civil and constitutional rights,

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text accompanying notes 234–35.

246. Ossorio & Duster, *supra* note 16, at 122.

247. See *supra* Part IV.C for more discussion about the danger of fueling racial stereotypes.

248. By “inaccurate” and “wrong,” I mean that the perpetrator's race as perceived by the witness differs from the perpetrator's self-identified race or from the race ascribed by the police to potential sample populations. Such a mismatch is possible not only because of faulty memory, but also because of the fluidity and subjectivity of racial identity. See *supra* note 157 and accompanying text.

249. See *supra* text accompanying notes 2–3.

250. See *supra* Part IV.B.

notably that of privacy, because the police use coercion (or their request is inherently, if not explicitly, coercive) to obtain DNA samples from people without any probable cause, and because unbeknownst to most dragnet participants, who believe they are consenting to have their DNA tested for that sole and specific case, law enforcement agencies often retain the samples after the investigation is over.<sup>251</sup> There has already been substantial controversy over dragnets on these grounds,<sup>252</sup> when the DNA is collected from persons who fit a witness's description and were in the region at the time the crime occurred.<sup>253</sup>

Using DNA-based racial profiles as the basis for dragnets will exacerbate the risk of civil and constitutional rights violations. Certainly, if police use dragnets for cases in which the genetic ancestry analysis accurately deduces the perpetrator's race, the racial profile can be beneficial in that it will help exclude innocent persons from the suspect pool. Yet we can never know of this happy result until after the fact, and it will not always be the case that the race prediction is correct since the science supporting DNA-based race determinations is far from surefire.<sup>254</sup> When AIMs analyses construct an erroneous racial profile, if law enforcement officials proceed with a dragnet based on that description, they will spend time, money, and energy collecting DNA from individuals who are not even of the "correct" race (the same race as the suspect) and possibly infringe on those innocent persons' rights in the process.

Since the methods used to generate DNA-based racial profiles are unreliable, conducting dragnets with the science, which affects up to thousands of "consenting" participants, is irresponsible at best, perhaps unconstitutional at worst. In this scenario, the people in the dragnet sample have done nothing to give law enforcement officials any reason to suspect them of criminal behavior. They are asked to submit DNA samples because

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251. Rothstein & Talbott, *supra* note 43, at 156 (noting that the DNA samples are kept in databases other than CODIS but used to compare against evidence retrieved from local crimes). This Note will not go into depth about whether and how dragnets interplay with the Fourth Amendment.

252. See generally MICHAEL BOYLAN, CENTER FOR AMERICAN PROGRESS, RACIAL PROFILING AND GENETIC PRIVACY: DEFINING THE PARAMETERS IN CRIMINAL CASES (2008) (exploring topics of racial profiling and genetic databases of innocent persons), available at [http://www.americanprogress.org/issues/2008/07/racial\\_profiling.html](http://www.americanprogress.org/issues/2008/07/racial_profiling.html); Bersett, *supra* note 65 (describing the legal issues that arise because "police must sidestep a number of potential Constitutional and civil rights violations when conducting DNA dragnets").

253. See *supra* text accompanying note 61.

254. See Rothstein & Talbott, *supra* note 43, at 159–62 (weighing individuals' privacy interests against law enforcement interests, and ultimately concluding that "the crime solving and prevention benefits of DNA databases justify the establishment, continuation, and funding of the CODIS system" but that these benefits "do not constitute a blanket justification for the use of DNA in unlimited ways").

they were in the vicinity of the crime at the time of its commission and, more importantly, because the suspect profile lists their race, which might not even correspond to that of the true perpetrator.<sup>255</sup> The harm of mistakenly subjecting innocent people to an investigation is easily avoided by not relying on DNA to deduce a suspect's race.

## V. CONCLUSION

DNA-based race determinations should not be used in the course of criminal investigations because the genetic science behind them is unsound and unreliable. When a person's AIMs are analyzed to ultimately predict his or her race, the process blurs the distinction between phenotype, ancestry, and race, and it oversimplifies the relationships that exist (or, in the case of race, does not exist) between each of these and DNA. Recent research in the molecular and social sciences alike has established that race is a social categorization, not a genetic phenomenon inscribed on our chromosomes.

DNA has some relation to elements that play into racial identity. For example, DNA affects phenotypic features, but its role is not well understood, and many nongenetic factors also influence physical traits. Additionally, genetic variability can shed light on geographic ancestry, but these are estimates and have limited applicability. Ancestry may correlate to race, but not always; in fact, the two are sometimes at odds. Phenotype and ancestry are important ingredients of racial identity, but race cannot be reduced to these factors alone. Neither can a person's race be surmised from DNA simply because these two elements have independent genetic significance. The process that claims to reveal race from DNA requires assumptions and approximations—and we should expect it to because race is not genetic. At the end of the day, the racial profile is speculative. Race is not encoded in DNA, nor can it be reliably inferred from it.

Using DNA to construct racial profiles of perpetrators would be detrimental because it could perpetuate stereotypes about race being a cause of criminal propensity. Including race in suspect descriptions has been shown to evoke negative stereotypes, especially against minorities, who are perceived as more violent and less law abiding. These stereotypes

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255. Michael Boylan, *Genetic Profiling: Ethical Constraints Upon Criminal Investigation Procedures*, 3 POL. & ETHICS REV. 236, 246 (2007) ("A person should only become a suspect when his verifiable actions justify such . . . Membership in a particular racial or ethnic group is not a previous action; therefore, it should not be used to make one a suspect in a case."). This journal is now known as *The Journal of International Political Theory*.

will persist and perhaps become even more powerful if genetic science claims to definitively discern the race of criminal perpetrators. The threat of massive civil and constitutional rights violations also looms if DNA is used to generate racial profiles, which are then used as the basis for dragnets. DNA dragnets are already viewed as intrusive and unconstitutional by many. If a dragnet is carried out on the basis of an incorrect DNA-based race prediction, the results are interference with many individuals' lives and possibly infringement of their rights, unnecessary expenditure of law enforcement resources, and a perpetrator who never becomes a suspect.

The very term "DNA-based race determination" is a contradiction of sorts. DNA is biological, and race is social; both are real, but there are no genes that create race. The legal community needs to recognize this fact. Once it does, it will realize that racial profiles based on genetic tests have no place in a criminal justice system that aspires to be rational and impartial.