A Web of Lives: Underregulated Genetic Surveillance of Local Communities Using the DNA of Families, Witnesses, and Victims

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INTRODUCTION

In 2021, police arrested a San Francisco woman for a burglary after identifying her using trace DNA evidence.[1] Soon after her arrest, however, the new San Francisco District Attorney, Chesa Boudin, dismissed the charges.[2] He had discovered that the DNA match that led to her arrest was made using a sample she had provided to help with a police investigation in 2016, after she was raped.[3] Without her consent or knowledge, the police retained her sample in their internal DNA database—which contained the DNA of not only perpetrators, but also witnesses, lab employees, and other victims.[4] In the five years since her sexual assault, her DNA had been compared to thousands of forensic samples from thousands of crimes for which she was not a suspect.[5] This was a standard practice for the San Francisco Police Department.[6] And other law enforcement agencies around the United States may be engaging in the same practice.[7]

Since the mid-2000s, many state and local law enforcement agencies have been fervently building their own DNA databases that are not integrated with

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1. Second Amended Complaint for Damages & Injunctive Relief at 2–3, Doe v. City of San Francisco, No. 22-cv-05179, 2023 WL 3695544 (N.D. Cal. Feb. 10, 2023).
2. *Id.* at 3, 9.
3. *Id.*
4. *Id.*
5. *Id.* at 2.
6. *Id.*
7. Jennifer Lynch, *Not Just San Francisco: Police Across the Country Are Retaining and Searching DNA of Victims and Innocent People*, ELEC. FRONTIER FOUND. (Feb. 16, 2022), https://www.eff.org/deeplinks/2022/02/not-just-san-francisco-police-across-country-are-retaining-and-searching-dna [https://perma.cc/9BQ9-ESU6].

the federal DNA databasing system, and therefore, free from federal regulation.[8] Although every state has at least one lab that participates federally,[9] many state databases are governed only by state law and contain genetic information that is not compatible with the federal system.[10] It is unclear how many state and local law enforcement agencies maintain these independent, or "rogue," databases that allow them to collect DNA samples and conduct searches that are prohibited in federal databases.[11] Other than samples collected from crime scenes, the federal network of state and national DNA databases—known as the Combined DNA Index System ("CODIS")—only allows anonymized data from arrestees and convicted offenders (this Comment will collectively refer to this class of individuals as "offenders") with restricted search parameters.[12] Rogue databases enable law enforcement to perform any search of which they are capable, on samples voluntarily given by victims; victims' families; juveniles; witnesses; people who wish to eliminate themselves as suspects; people who participated in DNA dragnets; and even from random people, unassociated with any crime, who the police happen to encounter (this Comment will collectively refer to this class of individuals as "non-offenders").[13]

If left underregulated, rogue DNA databases will continue to expand unchecked, aided by new DNA technologies that make it faster and cheaper to gather and analyze biological evidence.[14] Police efforts to include more

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8. Jason Kreag, *Going Local: The Fragmentation of Genetic Surveillance*, 95 B.U. L. REV. 1491, 1494 n.7, 1507 (2015).

9. *CODIS-NDIS Statistics*, FBI, https://le.fbi.gov/science-and-lab/biometrics-and-fingerprints/codis/codis-ndis-statistics [https://perma.cc/TJM5-WZSD].

10. Kreag, *supra* note 8, at 1497.

11. *Id.* at 1546–47; Erin Murphy & Jun H. Tong, *The Racial Composition of Forensic DNA Databases*, 108 CALIF. L. REV. 1847, 1864 (2020).

12. *Frequently Asked Questions on CODIS and NDIS*, FBI, https://www.fbi.gov/how-we-can-help-you/dna-fingerprint-act-of-2005-expungement-policy/codis-and-ndis-fact-sheet [https://perma.cc/RM3N-478B].

13. Kreag, *supra* note 8, at 1546–47. For instance, a Florida police approached a fifteen-year-old boy while he was sitting in a car with his friends and "asked which one of them wanted to give him a DNA sample." Lauren Kirchner, *DNA Dragnet: In Some Cities, Police Go from Stop-and-Frisk to Stop-and-Spit*, PROPUBLICA (Sept. 12, 2016), https://www.propublica.org/article/dna-dragnet-in-some-cities-police-go-from-stop-and-frisk-to-stop-and-spit [https://perma.cc/RY5A-Y47Y]. Thinking that he had to give the police his DNA, the boy complied with the officer's request; his DNA was added to the local database and remained there until his parents sued to have it removed. *Id.* Similarly, a twelve-year-old boy in New York City was given a soft drink by local police, who then confiscated the drink and used it to collect and input his DNA into the local database. Jan Ransom & Ashley Southall, *N.Y.P.D. Detectives Gave a Boy, 12, a Soda. He Landed in a DNA Database*, N.Y. TIMES (Aug. 15, 2019), https://www.nytimes.com/2019/08/15/nyregion/nypd-dna-database.html.

14. *See* Kreag, *supra* note 8, at 1532–33.

individuals in databases and to retain genetic information in perpetuity will likely exacerbate existing inequities in the criminal legal system.[15] Because "little reins in the police in their decision about whom to target, when, and why," the databases are likely full of the "usual suspects," resulting in overrepresentation for over-policed communities of color.[16] As will be discussed below, the proliferation of rogue databases threatens the constitutional rights of communities of color and has unique implications for women of color who already face the "dual frustration" of over-policing and under-protection.[17]

While CODIS has reasonable restrictions to deter the misuse of DNA samples and protect privacy, rogue databases evade these protections.[18] Although there are local procedures and policies that govern rogue databases, most of this information is not readily available to the public.[19] The constitutionality of genetic surveillance for offenders in highly regulated databases is well settled;[20] the constitutionality of non-offender DNA genetic surveillance in underregulated databases is more precarious.

This Comment argues that with innovations in DNA technology and heightened privacy expectations for non-offenders, law enforcement agencies are likely violating the Fourth Amendment by creating, maintaining, and using underregulated rogue databases. People who would not otherwise encounter the criminal legal system are now constantly being compared to crime scene samples—creating constant genetic surveillance under the guise of more efficient police work.[21] Without individualized suspicion or strong public policy interests to justify this surveillance, these searches are likely per se unreasonable under the Fourth Amendment.[22] To avoid these constitutional violations, states should develop statutory frameworks for local regulations that reflect community concerns for both over-policing and

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15. *Id.* at 1529.

16. Elizabeth E. Joh, Maryland v. King*: Policing and Genetic Privacy*, 11 OHIO ST. J. CRIM. L. 281, 285 (2013). Despite discriminatory effect or any potential discriminatory intent, "the actual motivations of the individual officers involved" are irrelevant under the Fourth Amendment. Whren v. United States, 517 U.S. 806, 813 (1996).

17. Amber Joy Powell & Michelle S. Phelps, *Gendered Racial Vulnerability: How Women Confront Crime and Criminalization*, 55 LAW & SOC'Y REV. 429, 429 (2021).

18. Joseph Goldstein, *Police Agencies Are Assembling Records of DNA*, N.Y. TIMES (June 12, 2013), https://www.nytimes.com/2013/06/13/us/police-agencies-are-assembling-records-of-dna.html.

19. *See, e.g.*, S.C. CODE ANN. § 23-3-640 (2024) (giving the State Law Enforcement Division the power to promulgate its own regulations for "testing, typing, and analysis").

20. *See infra* Section I.B.

21. Kreag, *supra* note 8, at 1492.

22. *See infra* Section I.B.

under-protection. To garner the cooperation of police and local communities, states will need to preserve the efficacy of these databases[23] while removing unconstitutional practices that perpetuate racial/ethnic, gender, and social inequities.

Part I covers the history of forensic DNA technology, explores current Fourth Amendment doctrine for DNA, and discusses the advancements to DNA technology that have occurred in the last decade. Part II provides a history of DNA databases, ranging from the establishment of the CODIS network to the creation of rogue databases that evade state and federal regulations. Part III argues current regulations fail to provide the requisite constitutional protections for non-offenders under the Fourth Amendment. Part IV discusses the policy ramifications of rogue databases on local communities, and Part V proposes statutory solutions to protect the privacy of non-offenders while maintaining law enforcement efficacy.

I. THE SCIENTIFIC AND DOCTRINAL DEVELOPMENT OF DNA

Deoxyribonucleic acid ("DNA") is the "gold-standard" of forensic science because of its inherent ability to distinguish individuals from each other.[24] Although 99.7% of DNA is identical between any two individuals, the remaining 0.3% contains enough varied genetic information to allow scientists to tell us apart.[25] Out of approximately three billion base pairs[26] in the human genome, there are, on average, six million base pairs that are different between any two people.[27] Every person inherits half of their DNA from each parent, who inherited their DNA from their parents.[28] New

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23. *See* Kreag, *supra* note 8, at 1509, 1516.

24. John H. Tibbetts, *Is Forensic Science Scientific?*, 70 BIOSCIENCE 377, 378 (2020); *see* Rafil Kroll-Zaidi, *Your DNA Test Could Send a Relative to Jail*, N.Y. TIMES MAG. (Jan. 3, 2022), https://www.nytimes.com/2021/12/27/magazine/dna-test-crime-identification-genome.html.

25. Erin Murphy, *Relative Doubt: Familial Searches of DNA Databases*, 109 MICH. L. REV. 291, 295 (2010).

26. Sarah A. Bates, *Base Pair*, NAT'L HUM. GENOME RSCH. INST. (Jan. 25, 2025), https://www.genome.gov/genetics-glossary/Base-Pair [https://perma.cc/96SW-J4GB]. Base pairs are a structural unit of DNA, composed of two "bases"—adenine and thymine, or cytosine and guanine—held together by hydrogen bonds. *Id.* The combination of these pairs, forming the DNA strand, is the basis of the "code" that eventually leads to the creation of proteins, and subsequently, the expression of our genetic traits. *See id.*; Elaine A. Ostrander, *Central Dogma*, NAT'L HUM. GENOME RSCH. INST. (Jan. 25, 2025), https://www.genome.gov/genetics-glossary/Central-Dogma [https://perma.cc/5WYQ-BBGH].

27. NAT'L INSTS. OF HEALTH, *Understanding Human Genetic Variation*, *in* BIOLOGICAL SCIENCES CURRICULUM STUDY (2007), https://www.ncbi.nlm.nih.gov/books/NBK20363 [https://perma.cc/N6Q8-V7TH].

28. *Id.*

combinations of DNA from generation to generation, coupled with environmental factors, help create the immense diversity that we see in the human population.[29] Forensic analysis of DNA not only distinguishes between people but is also capable of defining biological relationships between individuals—which can be as simple as a parent–child genetic inheritance or as complex as tracking the multi-generational diaspora of a person's ancestors.[30]

The legal field has substantial difficulty defining DNA and capturing its immense analytical power.[31] As one scholar put it, this difficulty stems from DNA's nature: it is "uniquely ours—and yet not entirely ours to control."[32] DNA is "personal yet transpersonal."[33]

Current technologies have surpassed the legal definitions of DNA, and impending advancements threaten to bring DNA further beyond legal understanding. The scientific and doctrinal contexts of rogue databases help highlight the constitutional harms that local DNA databases will likely create for non-offenders.[34] DNA's power to reveal unprecedented amounts of personal information heightens these risks.[35]

A. A Brief History of Forensic DNA

Forensic DNA methods are unique among traditional "pattern analysis" forensic methods because they were created and validated in scientific labs through "well-designed, rigorous studies" rather than in crime labs through trial and error.[36] The scientific roots of DNA evidence mean that its analysis

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29. *Id.*

30. John M. Butler, *Recent Advances in Forensic Biology and Forensic DNA Typing*, FORENSIC SCI. INT'L: SYNERGY, No. 100311, at 9, 14 (Dec. 27, 2022), https://www.sciencedirect.com/science/article/pii/S2589871X22000961?via%3Dihub [https://perma.cc/9BBG-VSQJ].

31. Elizabeth Anne Brown, *Your DNA Can Now Be Pulled from Thin Air. Privacy Experts Are Worried.*, N.Y. TIMES (May 15, 2023), https://www.nytimes.com/2023/05/15/science/environmental-dna-ethics-privacy.html; Thomas D. Holland, *Novel Features of Considerable Biologic Interest: The Fourth Amendment and the Admissibility of Abandoned DNA Evidence*, 20 COLUM. SCI. & TECH. L. REV. 271, 276 (2019); Kroll-Zaidi, *supra* note 24.

32. Kroll-Zaidi, *supra* note 24.

33. *Id.*

34. *See infra* Part IV.

35. *See* Tersia Oosthuizen & Loene M. Howes, *The Development of Forensic DNA Analysis: New Debates on the Issue of Fundamental Human Rights*, FORENSIC SCI. INT'L: GENETICS, No. 102606, at 4 (Oct. 16, 2021), https://www.sciencedirect.com/science/article/pii/S1872497321001435.

36. *Id.* at 6; Tibbetts, *supra* note 24, at 378.

produces results with known reliability and error rates.[37] This capability has become more and more important as the forensic and legal communities have discovered that many traditional forensic methods have systemic problems, including a lack of scientific rigor.[38]

Forensic DNA was special from the start. A molecular biologist, not a crime lab technician, conducted the first forensic use of DNA.[39] In 1986, English police asked Alec Jeffreys, a professor of molecular biology, to perform genetic analysis for a rape investigation.[40] Jeffreys used "minisatellites" in the DNA, which could be hundreds to thousands of base pairs long, and a chemical process known as gel electrophoresis to compare the rapist's DNA collected at the crime scene to that of the police's prime suspect.[41] He found that the suspect could not have been the perpetrator.[42] To find a new suspect, police conducted a DNA dragnet—a population-wide, compelled sampling—of more than four thousand men in the relevant community between the ages of seventeen and thirty-four.[43] Police arrested the culprit of the rape, Colin Pitchfork, for trying to avoid the dragnet.[44] Once he had collected Pitchfork's DNA, Jeffreys worked for six to eight weeks to sequence his "minisatellites" and compare them to the perpetrator's DNA sample.[45] Jeffreys concluded that Pitchfork was the likely source of the DNA, and Pitchfork became the first man ever convicted based on a DNA identification.[46]

By 1988, American police performed the world's second forensic DNA identification.[47] The technology was immediately met with controversy, as the people conducting DNA tests in the U.S. were lab technicians, not molecular biologists like Jeffreys.[48] Forensic scientists and lawyers pushed

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37. Tibbetts, *supra* note 24, at 378–79.

38. *Id.* at 377–78.

39. Celia Henry Arnaud, *Thirty Years of DNA Forensics: How DNA Has Revolutionized Criminal Investigations*, CHEM. & ENG'G NEWS (Sept. 18, 2017), https://cen.acs.org/analytical-chemistry/Thirty-years-DNA-forensics-DNA/95/i37 [https://perma.cc/AEP7-6WP2].

40. *Id.*

41. *Id.* Gel electrophoresis allows scientists to sort negatively charged DNA molecules according to their size by applying an electrical current across a bed of agarose gel. *What Is Gel Electrophoresis?*, YOUR GENOME, https://www.yourgenome.org/theme/what-is-gel-electrophoresis [https://perma.cc/ZDU5-WAWX].

42. Arnaud, *supra* note 39.

43. *Id.*

44. *Id.*

45. *Id.*

46. *Id.*

47. Jessica Gabel Cino, *Tackling Technical Debt: Managing Advances in DNA Technology that Outpace the Evolution of Law*, 54 AM. CRIM. L. REV. 373, 378 (2017).

48. Oosthuizen & Howes, *supra* note 35, at 3.

for the use of DNA technology despite push-back from molecular biologists who were upset that unskilled lab technicians were using Jeffreys's methods without any expert regulation or oversight.[49] Technicians had to use large, visible quantities of biological material—such as blood droplets or other bodily fluids—and perform arduous analyses that took weeks.[50] With substantial barriers to the use of this early technology, crime lab methods lacked standardization and statistical evaluation.[51]

Two important scientific innovations increased the accessibility of forensic DNA technology and, in doing so, standardized analysis procedures. First, polymerase chain reactions ("PCR") created a "boost in sensitivity" for DNA testing by copying the DNA found in a sample multiple times, making it easier for scientists and crime lab technicians alike to detect and analyze small samples of genetic material.[52] With this innovation, law enforcement no longer needed to collect visible amounts of biological material.[53] Second, and coupled with PCR, came the discovery of short tandem repeats ("STRs"), which could be used to identify potential perpetrators with short repeating segments of DNA (three to five base pairs) that made up fragments less than five hundred base pairs long—far fewer than the thousands that Jeffreys's minisatellite technique required.[54] The length of an STR fragment directly correlates with the number of repeats it contains, and the number of repeats is generally inherited from generation to generation.[55] In the late 1990s, scientists identified thirteen loci distributed across the human chromosome that were independently inherited, and thus highly informative of identity.[56]

With this innovation, DNA testing became faster, cheaper, and more distinguishing.[57] The identification of thirteen loci that could be used as a standardized system to inculpate or exculpate suspects also allowed law enforcement agencies to create early "profile archives" containing genetic information about each locus for every individual whose DNA was tested.[58] As techniques continued to improve, these modest profile archives grew into

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49. *Id.*
50. Stephen Mercer & Jessica Gabel, *Shadow Dwellers: The Underregulated World of State and Local DNA Databases*, 69 N.Y.U. ANN. SURV. AM. L. 639, 645–46 (2014).
51. Oosthuizen & Howes, *supra* note 35, at 3.
52. Arnaud, *supra* note 39.
53. Mercer & Gabel, *supra* note 50, at 646; Arnaud, *supra* note 39.
54. Arnaud, *supra* note 39.
55. *Id.*
56. *Id.*; FBI, *supra* note 12.
57. Mercer & Gabel, *supra* note 50, at 646.
58. Arnaud, *supra* note 39.

DNA databases which helped law enforcement take full advantage of the power of DNA—to identify individuals and to investigate them.[59]

B. Current Fourth Amendment Doctrine

Rapid growth in the accessibility and accuracy of DNA technology and in the cultivation of DNA databases eventually brought databasing practices under Fourth Amendment scrutiny. As relevant here, the Fourth Amendment provides "[t]he right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures."[60] The Amendment does not prohibit all intrusions, but only those that are "not justified in the circumstances, or which are made in an improper manner."[61]

The Supreme Court's leading decision on Fourth Amendment DNA doctrine is *Maryland v. King*,[62] which it decided amidst the first wave of DNA database expansion, as DNA samples from convicted offenders across the nation poured into CODIS.[63] The controversial decision opened the door to DNA database expansion outside of the CODIS regulatory framework.[64] Although the case contemplated the rights of an arrestee and not "programmatic searches of either the public at large or a particular class of regulated but otherwise law-abiding citizens,"[65] the doctrinal framework still provides useful insight into Fourth Amendment issues involving non-offender DNA databasing.

In 2009, police arrested Alonzo King in Maryland for first- and second-degree assault after "menacing a group of people with a shotgun."[66] During booking, police took a buccal swab from King and ran it through their DNA database.[67] The search returned a "hit," matching King's DNA to a specimen left behind at a rape six years prior.[68] The police did not investigate King during the initial rape investigation and only learned of his involvement because of King's 2009 DNA sample.[69] After being convicted of the rape,

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59. Butler, *supra* note 30, at 8.
60. U.S. CONST. amend. IV.
61. Schmerber v. California, 384 U.S. 757, 768 (1966).
62. 569 U.S. 435 (2013).
63. Mercer & Gabel, *supra* note 50, at 647; Goldstein, *supra* note 18; Joh, *supra* note 16, at 281. The first wave of DNA database expansion and the establishment of CODIS will be discussed *infra* Section II.A.
64. Joh, *supra* note 16, at 281–82.
65. *King*, 569 U.S. at 462.
66. *Id.* at 440.
67. *Id.*
68. *Id.*
69. *Id.*

King challenged his conviction, arguing that the DNA sample taken during his 2009 arrest was an unconstitutional search and seizure under the Fourth Amendment.[70] The Maryland Court of Appeals[71] agreed with King and set aside his conviction, which the State then appealed to the U.S. Supreme Court.[72]

Ultimately, the Court held that DNA collection and matching for the identification of arrestees for unrelated crimes is constitutional, even without individualized suspicion for the other crime.[73] The Court understood that it was ruling on an issue of undisputed importance concerning "expanding technology already in widespread use throughout the Nation."[74] Many critics, including Justices Scalia, Ginsburg, Sotomayor, and Kagan in dissent, felt that the majority improperly characterized DNA technology and failed to contemplate the far-reaching privacy implications of its decision.[75] This decision gave law enforcement agencies across the country the constitutional green light to integrate buccal swabs into their routine booking procedures, allowing them to dramatically expand their DNA databases.[76]

The Court's opinion had two key analyses: (1) whether a buccal swab is a search and (2) whether the search is reasonable.[77] The majority quickly concluded that taking a buccal swab from an arrestee constitutes a search subject to the Fourth Amendment and proceeded to evaluate its reasonableness.[78] Usually, Fourth Amendment searches require a warrant based on individualized suspicion; if police fail to obtain one, the search will

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70. *Id.*

71. The Maryland Court of Appeals was the state's court of last resort until December 14, 2022. *Supreme Court of Maryland*, MD. MANUAL ON-LINE (Aug. 28, 2023), https://msa.maryland.gov/msa/mdmanual/29ap/html/apf.html [https://perma.cc/U6HJ-M6ET].

72. *King*, 569 U.S. at 440–41.

73. *Id.* at 465.

74. *Id.* at 446.

75. *Id.* at 466, 480, 482 (Scalia, J., dissenting); Holland, *supra* note 31, at 276; Joh, *supra* note 16, at 290–92; *see also* Brown, *supra* note 31.

76. Goldstein, *supra* note 18.

77. *King*, 569 U.S. at 446. The Court's decision in *King* left open an important question: do subsequent comparisons of a person's DNA sample to crime scene samples in a DNA database constitute a search under the Fourth Amendment? *Id.* at 442. This question is beyond the scope of this Comment but poses important questions about the constitutionality of subsequent "searches." *See, e.g.*, State v. Mitcham, 535 P.3d 948, 960 (Ariz. Ct. App. 2023) (Catlett, J., concurring) (expressing frustration with the lack of clarity surrounding DNA analysis and whether analysis constitutes a Fourth Amendment search); Leslie v. City of New York, No. 22-cv-02305, 2023 WL 2612688, at *2 (S.D.N.Y. Mar. 23, 2023) (noting allegations that the New York Police Department's practice of collecting the DNA of "mere suspects" for comparison to crime scene evidence constitutes an unconstitutional Fourth Amendment search).

78. *King*, 569 U.S. at 446–47 (any physical intrusion will constitute a search).

be per se unreasonable.[79] In this case, however, the Court found that the use of standard procedure, strong public interest, and King's diminished privacy expectations excused this requirement.[80] King's privacy expectations were diminished because, as an arrestee, he was "already on notice . . . that some reasonable police intrusion on his privacy [was] to be expected."[81] Despite noting that some "privacy-related concerns are weighty enough that the search may require a warrant, notwithstanding the diminished expectations of privacy of the arrestee," the Court found that the information accessible through DNA is no more intrusive than the information accessible through traditional forensic methods such as photography and fingerprinting.[82] But even when a warrant is not required, the Fourth Amendment requires a warrantless search to be "reasonable in its scope and manner of execution."[83]

Reasonableness for warrantless searches is based on a balancing test that weighs government interests against individual privacy interests.[84] The Court gave "great weight both to the significant government interest at stake in the identification of arrestees and to the unmatched potential of DNA identification to serve that interest."[85] Although "urgent government interests are not a license for indiscriminate police behavior," the Court emphasized the utility of DNA databasing and provided five government interests: (1) necessity of identification; (2) safety while the arrestee is in custody; (3) the need to ensure that arrestees are available for trial; (4) the efficacy and efficiency of bail hearings; and (5) avoiding wrongful conviction.[86] Thus, the Court held that present government interests and future DNA identifications significantly outweighed King's already-diminished privacy interests.[87]

Throughout its opinion, the Court emphasized the importance of DNA technology to criminal investigations, explaining that DNA is just the newest and best version of the myriad tools that law enforcement uses to identify offenders.[88] Despite stating that "DNA identification is an advanced technique superior to fingerprinting in many ways, so much so that to insist on fingerprints as the norm would make little sense to either the forensic

79. *Id.* at 447–48. *But see* Andrew M. Carter, *Good Cops, Bad Cops, and the Exclusionary Rule*, 23 U. PA. J. CONST. L. 239, 262–64 (2021) (providing an overview of the Supreme Court's expansion of exceptions to the exclusionary rule).

80. *King*, 569 U.S. at 462–63.

81. *Id.* at 447.

82. *Id.* at 459, 463.

83. *Id.* at 448.

84. *Id.* at 461.

85. *Id.*

86. *Id.* at 448, 450–55.

87. *Id.* at 465.

88. *Id.* at 442, 451.

expert or a layperson," the Court insisted that DNA does not create any additional privacy intrusion when compared to its traditional counterparts.[89] The majority placed heavy emphasis on the fact that law enforcement only analyzes non-coding alleles—also known as "junk DNA"—and analogized this technique to comparing photographs, fingerprints, or body measurements.[90] The Court even acknowledged that increased forensic capabilities allowing police to determine "an arrestee's predisposition for a particular disease or other hereditary factors not relevant to identity . . . would present additional privacy concerns not present here."[91] What the *King* Court failed to do, however, was acknowledge the investigatory power of DNA far beyond the thirteen CODIS alleles and traditional forensic methods.

Justice Scalia illuminated this failure in his impassioned dissent, arguing that the majority's decision enables unconstitutional searches without individualized suspicion.[92] He differentiated DNA from traditional forensic methods, particularly given the unparalleled power of DNA to reveal deeply personal information about an individual beyond their criminal history.[93] Although the majority insisted that law enforcement will only use DNA for "identification" purposes, Scalia noted that law enforcement used King's DNA to search a database with DNA samples from unsolved crimes.[94] The police did not identify King—they investigated him.[95]

Therefore, the privacy implications of King's DNA testing were far greater than those stated by the majority.[96] A dual practice of databasing both DNA and fingerprints points to the investigatory purpose of DNA searches.[97] If law enforcement were only interested in identification, it would be redundant to take both DNA and fingerprints: fingerprints "are taken primarily to identify" arrestees, and DNA is taken only "to solve crimes."[98] By failing to recognize the far-reaching investigatory power of DNA, the majority unreasonably elevated the government's crime-solving interest far above the individual privacy interests of the public.[99]

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89. *Id.* at 459.
90. *Id.* at 457–58.
91. *Id.* at 464–65.
92. *Id.* at 466 (Scalia, J., dissenting).
93. *Id.* at 478–80.
94. *Id.* at 472–74.
95. *Id.* at 472.
96. *Id.*
97. *Id.* at 477–78.
98. *Id.* at 478.
99. *See id.* at 469–71.

Other critics, both legal and scientific, have echoed Scalia's concerns. A scientific understanding of DNA shows that this forensic technology is far more potent than any other; unlike fingerprints, DNA databasing "forever implicate[s]" individuals as "usual suspects"—comparing them against every collected crime scene sample.[100] By expanding DNA databases and failing to address whether subsequent database searches constitute Fourth Amendment searches, the *King* majority gave police further incentive "to turn every encounter into an arrest."[101] As a natural consequence of this broadening, even routine traffic stops may be used as opportunities to collect DNA.[102] Scholars argue that DNA doctrine is ineffective because it was developed by judges and lawyers, many of whom have only had limited exposure to introductory biology and DNA science and who do not have the capacity to keep track of developments in molecular biology.[103] To avoid grappling with the science behind forensic DNA, some judges even take judicial notice of its reliability without further inquiry.[104]

Overall, the current Fourth Amendment doctrine gives law enforcement substantial leeway to collect and maintain DNA samples in federally regulated databases.[105] The privacy concerns that the Court grappled with in *King* are only the beginning and should be more carefully contemplated in the states. Beyond the privacy concerns of arrestees whose DNA is eligible for CODIS lie the privacy concerns of non-offenders whose DNA is being kept in underregulated rogue databases.[106] Even the *King* majority would likely take constitutional issue with banking DNA from non-offenders in perpetuity.[107] Recent and imminent innovations in DNA technology highlight the scope of these concerns.

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100. Brandon L. Garrett & Erin Murphy, *Too Much Information*, SLATE (Feb. 12, 2013), https://slate.com/news-and-politics/2013/02/dna-collection-at-the-supreme-court-maryland-v-king.html [https://perma.cc/8GLU-HD3B].

101. Joh, *supra* note 16, at 285; *see* Brown, *supra* note 31.

102. Joh, *supra* note 16, at 291 ("By relying on a balancing of interests that will surely never favor the individual from whom a DNA sample is taken, the *King* majority invites (and nearly decides) what is likely to be one of the next important DNA controversies in policing: *Terry* stops that involve the compulsory collection of DNA. Justice Ginsburg directly raised the question in the *King* oral argument.").

103. *See, e.g.*, Holland, *supra* note 31, at 276.

104. Cino, *supra* note 47, at 374.

105. Joh, *supra* note 16, at 283, 289–90. Although *King* was limited to violent arrestees, the opinion did not establish privacy protections for others who encounter police. *See* Maryland v. King, 569 U.S. 435, 462 (2013).

106. For a discussion of constitutional concerns for non-offenders, see *infra* Section III.A.

107. *See infra* Section V.A.

C. A Decade of DNA Innovation

The *King* majority warns that "science can always progress further, and those progressions may have Fourth Amendment consequences."[108] In the decade after *King*, DNA has rapidly grown as a powerful investigative tool, generating suspects before the police even begin investigating.[109] When DNA technology first emerged in the world of forensics, the process was so long and arduous that police could only use it to inculpate or exculpate known suspects.[110] Now, innovation in crime labs is occurring so fast that molecular biologists—who are constrained by scientific confirmation and validation—cannot keep up with forensic progress.[111] Instead of relying on a few loci, rogue databases may have access to entire genomes.[112]

1. Current Forensic DNA Technology

Since *King*, there have been significant changes in forensic DNA methods. Instead of using thirteen loci, CODIS databases now use twenty.[113] Further, "junk DNA" loci have recently been shown to have some indica of genetic ancestry[114]—a discovery that directly contradicts the *King* majority's assertion that DNA is a limited functional equivalent of fingerprinting.[115] Far beyond seven additional loci, new advances in the biological resolution of DNA testing, improved isolation techniques, and more powerful computing software have increased cost and time efficiency—allowing law enforcement to access and interpret more of the genome.[116] Three key developments have been largely responsible for this progress.

First, Rapid DNA analysis ("Rapid DNA") can generate a complete DNA profile in approximately ninety minutes without any human intervention or specialized forensic training.[117] This technology makes it easier and faster than ever for law enforcement to accumulate genetic information from

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108. *King*, 569 U.S. at 464.
109. *See* Arnaud, *supra* note 39.
110. *See id.*
111. *See* Oosthuizen & Howes, *supra* note 35, at 6; Brown, *supra* note 31.
112. *See* Oosthuizen & Howes, *supra* note 35, at 7.
113. Arnaud, *supra* note 39.
114. Cino, *supra* note 47, at 381.
115. Maryland v. King, 569 U.S. 435, 442–43, 451–52 (2013).
116. Mercer & Gabel, *supra* note 50, at 649; Arnaud, *supra* note 39; Butler, *supra* note 30, at 12.
117. Butler, *supra* note 30, at 6.

individuals and from crime scene samples.[118] Rapid DNA requires the use of "consumable cartridges with expiration dates," which means that law enforcement who use the technology "would need to process six DNA samples per week to avoid having to discard an expired cartridge," even without an investigatory need to collect six samples.[119] In addition to this resource incentive, the FBI has allowed integration of Rapid DNA with CODIS.[120] Rapid DNA does not have the same quality, however, as traditional, lab-based DNA analysis performed by specialists.[121]

Second, familial DNA searches allow law enforcement to search for close relatives of a perpetrator when those relatives are already within the DNA database.[122] Depending on state laws, many labs around the U.S. are already conducting these searches, often without public knowledge.[123] Partial matching is a variation of familial matching, [124] which uses standard CODIS software with a low-resolution search to find similar, but not identical profiles, [125] rather than using a software expressly designed to locate family relationships. [126] Partial matching is allowed in CODIS databases, but familial matching is not.[127]

Third, forensic genetic genealogy uses commercial genealogy websites to analyze hundreds of thousands of base pairs "to enable associations of relatives as distant as third or fourth cousins."[128] Scholars predict that more than half of Caucasian-Americans, even those who have never contributed to a genealogy program, could be easily identified with genetic information

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118. *See* Douglas R. Hares et al., *Rapid DNA for Crime Scene Use: Enhancements and Data Needed to Consider Use on Forensic Evidence for State and National DNA Databasing—An Agreed Position Statement by ENFSI, SWGDAM and the Rapid DNA Crime Scene Technology Advancement Task Group*, FORENSIC SCI. INT'L: GENETICS, No. 102349, at 2 (July 8, 2020), https://doi.org/10.1016/j.fsigen.2020.102349.

119. Butler, *supra* note 30, at 8.

120. *Rapid DNA*, FBI, https://le.fbi.gov/science-and-lab/biometrics-and-fingerprints/codis-2/rapid-dna [https://perma.cc/Q7UD-AMHD].

121. *See* Hares et al., *supra* note 118, at 2.

122. Butler, *supra* note 30, at 9.

123. *See, e.g.*, State v. Mitcham, 535 P.3d 948 (Ariz. Ct. App. 2023).

124. Sara Debus-Sherrill & Michael B. Field, *Familial DNA Searching–An Emerging Forensic Investigative Tool*, 59 SCI. & JUST. 20, 20–22 (2019).

125. *Id.* at 20–22.

126. Oosthuizen & Howes, *supra* note 35, at 6.

127. FBI, *supra* note 12; Andrea Roth, *"Spit and Acquit": Prosecutors as Surveillance Entrepreneurs*, 107 CALIF. L. REV. 405, 426 (2019).

128. Butler, *supra* note 30, at 9.

already contained in public genealogy databases.[129] Because of the amount of data these searches analyze, they uncover substantial information about an individual and their ancestry, creating privacy concerns that affect entire family trees.[130]

2. Future Developments in DNA Technology

New DNA technologies are constantly increasing the investigative power of genetics.[131] The use of these new technologies has shifted the function of DNA analysis from the inculpation or exculpation of suspects in the course of a criminal investigation into an investigative tool that can generate suspects for the police.[132] Recent advances in testing sensitivity and next-generation DNA sequencing can detect miniscule amounts of DNA, distinguish between individuals in a mixture of DNA, and predict suspects' appearance and behaviors.[133]

The sensitivity of DNA testing has already increased with the development of Trace DNA and will increase even further with environmental DNA ("eDNA"). Trace DNA allows examiners, who may or may not be trained scientists,[134] to recover complete DNA profiles from surfaces that someone touched for only a few seconds.[135] Trace DNA from one individual can even be transferred to a surface by another individual after a handshake.[136] Where investigations once required visible amounts of bodily fluid to develop DNA profiles, scientists can now "recover medical and ancestry information from minute fragments of human DNA lingering" in air or water with eDNA technology.[137] As these technologies continue to improve, it may become almost impossible to avoid leaving DNA in any

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129. Tibbetts, *supra* note 24, at 382. Several famous cases that have used forensic genetic genealogy, including the apprehension of the notorious Golden State Killer, have brought to light privacy violations by direct-to-consumer databases such as Ancestry.com and GEDmatch. Jordan Smith, *Police Are Getting DNA Data from People Who Think They Opted Out*, INTERCEPT (Aug. 18, 2023), https://theintercept.com/2023/08/18/gedmatch-dna-police-forensic-genetic-genealogy [https://perma.cc/2R8Q-BMC8]. Law enforcement had been using these systems to analyze DNA profiles based on the data of sample donors who believed they had opted out of the search program. *Id.*

130. *See* Murphy & Tong, *supra* note 11, at 1862.

131. *See* Oosthuizen & Howes, *supra* note 35, at 4–5.

132. *Id.* at 5.

133. Butler, *supra* note 30, at 14.

134. *See* Tibbetts, *supra* note 24, at 377.

135. Butler, *supra* note 30, at 12.

136. Oosthuizen & Howes, *supra* note 35, at 4.

137. Brown, *supra* note 31.

space you enter.[138] However, these tests may not be the crime-solving blessings they appear to be. Because eDNA tests are so sensitive to genetic material, they will likely detect DNA that is irrelevant to an investigation.[139] This sensitivity could also result in wrongful convictions, particularly when evidence and suspect samples are tested in the same lab.[140] For eDNA, the error rate is currently so high that an apparent genetic signature could easily be inaccurate.[141] Yet as this technology improves, the ubiquity of eDNA will make it a frighteningly powerful tool for genetic surveillance.[142]

Low copy number ("LCN") and mixed-contributor DNA samples present not only significant opportunities but also challenges to investigators, as the quality of a sample directly correlates to the accuracy of a match.[143] LCN, or "degraded," DNA is often consumed during the analysis process as there are only small, low-quality amounts of DNA to begin with.[144] This may cause parts of the sequence to be lost, which would generate incorrect profiles.[145] The analysis of DNA mixtures has become more promising but needs further development. A recent innovation is probabilistic genotyping, which distinguishes between multiple contributors to a mixed DNA sample by proposing the most likely genotypes for possible contributors.[146]

Massively Parallel Sequencing, which allows highly sensitive tests of single nucleotide polymorphisms and STRs within large sequences of base pairs at a resolution unattainable by traditional PCR analysis, has improved the speed and accuracy of DNA sequencing.[147] This detailed sequencing allows for detailed analysis of a person's genome, including for genes that indicate ancestry, control phenotype (external appearance), and predict behavior.[148] Coupled with lineage markers from non-autosomal DNA, such

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138. *Id.*

139. Butler, *supra* note 30, at 14; Mercer & Gabel, *supra* note 50, at 646.

140. *See* Tibbetts, *supra* note 24, at 380 ("[I]t is a common practice in some forensic labs to process a DNA swab from a suspect at the same time and room setting that they process evidence such as weapons or clothing from the crime scene. Tiny bits of DNA can be disturbed and float around a laboratory, contaminating evidence."); Brown, *supra* note 31.

141. *See* Brown, *supra* note 31.

142. *Id.*

143. *See* Cino, *supra* note 47, at 380–81.

144. *See* Oosthuizen & Howes, *supra* note 35, at 4.

145. *Id.*

146. Arnaud, *supra* note 39; *see* Arwin Ralf & Manfred Kayser, *Investigative DNA Analysis of Two-Person Mixed Crime Scene Trace in a Murder Case*, FORENSIC SCI. INT'L: GENETICS, No. 102557, at 7 (June 20, 2021), https://www.fsigenetics.com/action/showPdf?pii=S1872-4973%2821%2900094-6 [https://perma.cc/B964-J6L7].

147. Oosthuizen & Howes, *supra* note 35, at 4; Butler, *supra* note 30, at 14.

148. Andrew Pollack, *Building a Face, and a Case, on DNA*, N.Y. TIMES (Feb. 23, 2015), https://www.nytimes.com/2015/02/24/science/building-face-and-a-case-on-dna.html.

as the X or Y chromosomes, and non-nuclear DNA, such as mitochondrial DNA, these ancestry estimates will become highly discerning.[149] For instance, scientists have already isolated genes that accurately predict eye, hair, and skin color.[150] Some suggest that this technology will serve as a genetic eyewitness, but legal scholars are concerned that a computer-generated image of a suspect may violate the Confrontation Clause.[151] There are further concerns that with the ability to predict appearance and behavior, these techniques will exacerbate racial profiling and conceptions of genetic criminality.[152]

These new methods have not been approved for use in CODIS, but local labs are likely already using some of these technologies.[153] While most methods are still in testing phases, local labs have already begun to analyze LCN DNA.[154] Historically, "police have been quick to embrace unproven tools,"[155] and the promise of these new technologies will be more tempting than ever.

As DNA technology improves, attorneys, judges, and juries will continue to rely on DNA evidence to resolve cases.[156] This reliance is not misplaced. DNA is the gold standard of forensic science and an incredible tool to identify otherwise unknown criminal perpetrators, identify missing persons, and to exonerate the wrongfully convicted.[157] But DNA testing is still subject to error and bias, particularly in cases involving degraded DNA or mixed samples.[158] Without corroborating evidence, DNA shows only presence, not guilt.[159] Local crime labs are generally understaffed and often undertrained, meaning that unqualified individuals perform DNA analyses relying on unscientific guesswork.[160] Despite the relative objectivity of DNA, studies of DNA testing have revealed that forensic examiners with context for their

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149. *See* Butler, *supra* note 30, at 15.

150. Arnaud, *supra* note 39; Pollack, *supra* note 148.

151. *See* Cino, *supra* note 47, at 414.

152. Pollack, *supra* note 148; *see also* Mercer & Gabel, *supra* note 50, at 688–89.

153. *See* Arnaud, *supra* note 39.

154. Cino, *supra* note 47, at 385.

155. Brown, *supra* note 31.

156. Oosthuizen & Howes, *supra* note 35, at 7.

157. *Id.* at 6.

158. *Id.* at 4. There have already been false accusations made against individuals based on results obtained from DNA databases affected by "cross contamination, mislabeling of samples, or interpretive errors." Roth, *supra* note 127, at 415.

159. Oosthuizen & Howes, *supra* note 35, at 4.

160. NAT'L RSCH. COUNCIL, DOC. NO. 228091, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 6 (2009); *see* Tibbetts, *supra* note 24, at 377.

samples often reach different conclusions than those without context.[161] Particularly in rogue databases lacking external oversight, confirmation bias is likely to affect results.[162]

II. THE EMERGENCE OF "ROGUE" LOCAL DNA DATABASES

As DNA technology standardized, law enforcement realized the crime-solving potential of databases to compare offenders' DNA to DNA recovered at crime scenes. Thus, in 1990—just four years after the first successful use of forensic DNA—the United States instituted a pilot program of a National DNA Index System ("NDIS").[163] By 1994, Congress created CODIS, putting into place a national network of laboratories that shared highly regulated genetic information.[164]

A. The First Wave: Early Databases and the Creation of CODIS

From its first use, the power of DNA was evident. Establishing databases to house highly individualized identifying information about perpetrators and convicted offenders allowed investigators to make previously unknown connections using biological materials recovered from the scene of a crime.[165] Given these benefits, law enforcement across the United States began investing money, time, and resources into collecting and maintaining records of DNA.[166] To aid with these efforts, the federal government invested substantial funds to crime labs, "specifically earmarked for DNA expansion," including research and development.[167] The disproportionate funding to DNA—at the time, used in a relatively small portion of cases—left traditional forensic methods behind and cemented DNA's "gold standard" status.[168]

The first wave of DNA database expansion occurred at the national and state level.[169] In 1990, the United States launched a pilot program for a NDIS,

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161. *See* Itiel E. Dror & Greg Hampikian, *Subjectivity and Bias in Forensic DNA Mixture Interpretation*, 51 SCI. & JUST. 204, 204–05 (2011).

162. Tibbetts, *supra* note 24, at 379.

163. Mercer & Gabel, *supra* note 50, at 650.

164. DNA Identification Act of 1994, Pub. L. No. 103-322, 108 Stat. 2065 (codified as amended at 34 U.S.C. §§ 12591–12593).

165. Butler, *supra* note 30, at 8.

166. *See id.*

167. Cino, *supra* note 47, at 373.

168. *Id.* at 373.

169. Mercer & Gabel, *supra* note 50, at 647.

operated with CODIS software.[170] Within another four years, the pilot was in official use and the DNA Identification Act of 1994 was passed.[171] CODIS was operating across a national network of labs which contributed DNA samples that complied with federal regulation.[172]

The CODIS system has three levels: local, state, and national.[173] NDIS forms the national level.[174] NDIS contains two databases: a "Forensic Index," which contained DNA profiles "developed from crime scene evidence" and a "Convicted Offender and Arrestee Ind[ex]," which contained anonymized DNA profiles from known convicted offenders.[175]

Congress knew from the start, however, that maintaining such a repository of individual information presented significant privacy and security issues.[176] Before the DNA Identification Act was passed, the National Research Council conducted a study of Forensic DNA.[177] The DNA committee found that the unique combination of advancement in molecular biology and computing posed "difficult issues," including that DNA could be a double edged sword when applied to crimes without individualized suspicion.[178] Unlike the forensic techniques that had come before, DNA contained "more personal information," leading to discomfort about "confidentiality and privacy if [that information was] used within the criminal justice system."[179] Recognizing these kinds of concerns, Congress chose to build a system of "skeletal data."[180]

Because of substantial privacy concerns that emerged alongside these databases, the CODIS system has strict requirements for what DNA samples can be submitted and what tests contributing labs can run within the index.[181] First, CODIS limits whose DNA can be included in the Convicted Offender

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170. *Id.* at 650; FBI, *supra* note 12.

171. Mercer & Gabel, *supra* note 50, at 652.

172. Cino, *supra* note 47, at 379.

173. FBI, *supra* note 12.

174. *Id.*

175. *Id.*; Mercer & Gabel, *supra* note 50, at 650. Justice Scalia discusses these two databases at length in his dissent in *Maryland v. King*, 569 U.S. 435, 473, 476 (2013) (Scalia, J., dissenting). He criticized the majority's reasoning noting that King's DNA was compared to the Forensic Index—which he refers to as the "Unsolved Crimes Collection"—rather than the Convicted Offender and Arrestee Index. *Id.* By comparing King's DNA to the Forensic Index, the police were investigating unsolved crimes, rather than simply identifying the arrestee, which would have been properly done through the Convicted Offender and Arrestee Index. *Id.*

176. *See* Murphy & Tong, *supra* note 11, at 1854.

177. *See generally* NAT'L RSCH. COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE (1992).

178. *See id.* at 111, 113–14.

179. Oosthuizen & Howes, *supra* note 35, at 3.

180. *See* Murphy & Tong, *supra* note 11, at 1854.

181. *See* Mercer & Gabel, *supra* note 50, at 652.

and Arrestee Index.[182] Profiles from victims, bystanders, and mere suspects cannot be submitted.[183] Nor can law enforcement include elimination samples which were voluntarily provided.[184]

Second, CODIS limits what kinds of samples can be included in the system.[185] Until recently, only traditional PCR samples were compatible with the system, but the FBI now allows Rapid DNA samples.[186] Strict prohibitions remain in place for sample quality, excluding LCN, mixture, and partial profiles.[187] In addition to these biological requirements, samples uploaded to the Forensic Index must come from an unknown person, but be "attributable to the putative perpetrator."[188] All samples uploaded to CODIS must be prepared and tested at accredited laboratories.[189]

Third, CODIS limits what kinds of tests can be run on the DNA samples within its databases.[190] The highly regulated Convicted Offender and Arrestee Index and Forensic Index can be compared against each other to determine if any of the anonymized offenders are potential perpetrators of the unsolved crimes.[191] This is an incredibly powerful tool, aiding hundreds of thousands of investigations since CODIS was created.[192] The two databases cannot be used for familial or genealogical searches; however, the system does allow partial matching as law enforcement can loosen search parameters in order to find similar, but not identical, genetic profiles.[193]

In sum, these regulations mean that agencies who participate in CODIS can only store and search for properly anonymized DNA profiles, identifiable exclusively by Agency and Specimen Identification Numbers that tie the sample to the contributing agency.[194] As of December 2024, the NDIS system contained approximately eighteen million offender profiles, nearly six million arrestee profiles, and over one million forensic profiles.[195] Every state has at least one NDIS-participating lab,[196] which must comply with the

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182. *Id.* at 651.
183. FBI, *supra* note 12.
184. Mercer & Gabel, *supra* note 50, at 653.
185. *Id.*
186. *See* FBI, *supra* note 120.
187. Mercer & Gabel, *supra* note 50, at 653–54; Roth, *supra* note 127, at 425.
188. Roth, *supra* note 127, at 424.
189. *Id.*
190. Mercer & Gabel, *supra* note 50, at 651.
191. *Id.* at 650.
192. *See* FBI, *supra* note 9.
193. *See* FBI, *supra* note 12; Roth, *supra* note 127, at 425–26.
194. FBI, *supra* note 12.
195. *See* FBI, *supra* note 9.
196. *See id.*

quality standards of CODIS, and submit to audits to ensure such compliance.[197]

B. The Second Wave of DNA Database Expansion

The excitement of CODIS quickly wore off when state and local law enforcement agencies realized how restricted their samples and searches would be in the federal system.[198] Additionally, they were frustrated with the processing time for CODIS searches.[199] Even though every state statutorily created a DNA database that was compatible with CODIS, they realized that when federal audits did occur, the only profiles that were reviewed were those that were uploaded CODIS.[200]

Disillusioned from the highly regulated CODIS system, and without effective federal oversight, some state and local authorities created rogue databases, in which they could store genetic information associated with known offenders, conduct searches strictly forbidden by CODIS, and when they could afford it, use private companies to get faster results.[201] Most state and local crimes are not homicides or violent or sexual offenses, and thus, CODIS's restriction to these "high-level" crimes made law enforcement feel as though it was left with no resource to deal with low-level crime and the repeat offenders of those crimes who evaded prosecution.[202] The allure of complete local control over forensic DNA databasing drove the fragmentation of what had briefly been a national system of genetic surveillance.[203]

Most databases were created by law enforcement agencies or district attorneys' offices to hold genetic information that neither state nor federal law authorized.[204] Law enforcement could gather a collection of "potential future suspects."[205] Although the policies of local databases are unclear in the limited publicly available information,[206] wider inclusion of samples and

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197. Maryland v. King, 569 U.S. 435, 455 (2013).

198. Goldstein, *supra* note 18.

199. *Id.*

200. *Id.*; Mercer & Gabel, *supra* note 50, at 647, 669.

201. Mercer & Gabel, *supra* note 50, at 647–49; Smith, *supra* note 129; *see* Kreag, *supra* note 8, at 1503.

202. Goldstein, *supra* note 18; Kreag, *supra* note 8, at 1503.

203. Kreag, *supra* note 8, at 1547 n.311.

204. Murphy & Tong, *supra* note 11, at 1864.

205. Kreag, *supra* note 8, at 1534 n.243.

206. For a discussion of state statutory regulation of DNA databases, see discussion *infra* Part V.

allowance of testing not permitted in CODIS allow law enforcement to investigate both past and future crimes with unprecedented genetic information.[207] With the help of high-tech private systems, "nearly instantaneous notification . . . of any hits generated in the database" is also possible.[208] Increased sensitivity of DNA testing can generate leads in crimes which were considered non-DNA crimes (such as property crime) and maximize genetic crime-solving potential.[209]

It is unclear how many rogue databases exist because, by their nature, they are managed "secretively."[210] Operating under the radar, "largely free from reliance on public funding or existing legal apparatuses," has allowed law enforcement to amass more genetic information than would be possible with traditional databasing.[211] In one estimate, the Vice President of Sales and Marketing for Bode Cellmark Forensics, one of the leading private platforms for rogue databases, suggested that there are one thousand agencies across the country theoretically large enough to have their own database.[212] As long as a private company, like Bode, can satisfy the quality requirements for samples that will be submitted to CODIS, local law enforcement agencies that can afford their services can host both a public CODIS-participating database and a rogue database.[213] Not only do these databases provide an excellent market for private labs, but they also give law enforcement a way to use cutting edge technology to harness the genetic information contained in DNA that is beyond their reach in the federal system.[214]

Given the potential crime-fighting benefits of rogue databases, law enforcement across the country have been aggressively, but quietly, growing their databases with the belief that more DNA profiles will solve more crimes.[215] For instance, the Orange County District Attorney's office asks misdemeanants for their DNA in exchange for a reduction or dismissal of

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207. Garrett & Murphy, *supra* note 100.

208. Kreag, *supra* note 8, at 1518.

209. *Id.* at 1496, 1504.

210. *See, e.g.*, Roth, *supra* note 127, at 421.

211. *Id.*; *see* Goldstein, *supra* note 18 (noting the growing number of rogue databases that incorporate DNA collected without donors' knowledge and "operate under their own rules, providing the police much more leeway than state and federal regulations").

212. Roth, *supra* note 127, at 436.

213. Mercer & Gabel, *supra* note 50, at 653.

214. Roth, *supra* note 127, at 437, 451; Kreag, *supra* note 8, at 1507; *see also* Kirchner, *supra* note 13 ("Bode Cellmark Forensics charges about $100 to $150 a swab—little enough for cops to swab everything from the steering wheel of a stolen car to the nozzle of a spray-paint can used for vandalism—and boasts a 30-day turnaround time for results.").

215. Garrett & Murphy, *supra* note 100.

charges.[216] Some agencies simply ask suspects for their DNA or conduct DNA dragnets to capture large sets of DNA samples at once.[217] Some jurisdictions ask people to voluntarily give their DNA during traffic stops, stop-and-frisks, and any other chance encounter with police.[218] Some collect "abandoned" or "surreptitious" DNA from water bottles, cigarettes, and other discarded items from known individuals to use as reference samples.[219] People who provide samples of their DNA to eliminate themselves as suspects would likely be shocked to find that police then keep their DNA in perpetuity.[220] Some law enforcement agencies even go so far as to retain the DNA of victims of violent crime in case they can use their DNA to solve crimes in the future.[221] The reach of the databases does not stop there.[222] Because of the power of familial and genealogical searches, police can use their non-offender databases as "suspect-generating system[s]."[223] Every time an individual's DNA is added to a rogue database, so is the DNA of their biological relatives.[224]

Local law enforcement may be willing to reach beyond these limits because they see rogue databases "as a solution to an assortment of policing challenges, arguing that they increase clearance rates while using fewer resources than investigative methods, deter criminal activity, decrease the opportunity for latent biases and negative stereotypes to affect policing decisions, and strengthen the public's perception of the police."[225] Proponents of rogue databases argue that widespread genetic surveillance is justified, even to help solve petty crimes.[226] Arguing against concerns that rogue

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216. Roth, *supra* note 127, at 407. This practice was scrutinized in a case challenging the practice under the California Constitution. *See generally* Thompson v. Spitzer, 307 Cal. Rptr. 3d 183 (Ct. App. 2023). Although the plaintiffs' case was originally dismissed, the Court of Appeals remanded, allowing the plaintiffs to argue their as-applied constitutional challenges in trial court. *Id.* at 205.

217. Goldstein, *supra* note 18; Kreag, *supra* note 8, at 1497.

218. *See, e.g.*, Kirchner, *supra* note 13; Kreag, *supra* note 8, at 1509.

219. Kreag, *supra* note 8, at 1509; Goldstein, *supra* note 18; *see, e.g.*, Leslie v. City of New York, No. 22-cv-02305, 2023 WL 2612688 (S.D.N.Y. Mar. 23, 2023).

220. Goldstein, *supra* note 18.

221. *See, e.g.*, Second Amended Complaint at 2, 9, Doe v. City of San Francisco, No. 22-cv-05179, 2023 WL 3695544 (N.D. Cal. Feb. 10, 2023); Goldstein, *supra* note 18; *see also* Kreag, *supra* note 8, at 1497, 1503, 1509, 1529.

222. *See* Murphy & Tong, *supra* note 11, at 1859 (explaining how increased use of a DNA database allows police to search for similarly matched DNA, or "near-misses," even when a search for an exact match fails).

223. *Id.*

224. *See id.* at 1859–62

225. Kreag, *supra* note 8, at 1496.

226. *See* Mercer & Gabel, *supra* note 50, at 670.

databases will exacerbate racial inequities, law enforcement agencies urge that genetic data will replace "police intuition" in interactions with over-policed communities, decreasing the effects of institutional racism.[227] Despite these claims, after an initial improvement in some jurisdictions,[228] databases have not served their purpose as dramatically as their proponents claim.[229] Law enforcement may believe that the benefits of DNA databasing "outweigh the intangible, fuzzy ethical and privacy problems such an underregulated expansion brings."[230]

III. THE CONSTITUTIONALITY OF ROGUE DATABASES

Considering policy and constitutional concerns, states should update their database statutes to prevent constitutional abuses in rogue databases. In doing so, states will need to balance community concerns about over-policing and under-enforcement with law enforcement interests in effective policing. These regulations must place controls on the types of samples that can be included in these databases, as well as on the types of searches that can be conducted. Because individuals are more likely to encounter local law enforcement than state or federal law enforcement,[231] balancing the interest of local stakeholders will be key to developing effective policies.

The first Section below argues that rogue databasing of genetic material from non-offenders is unconstitutional.[232] The second Section uses familial DNA searches to illustrate the argument.[233]

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227. Kreag, *supra* note 8, at 1524–25.

228. *See, e.g.*, *id.* at 1509; Goldstein, *supra* note 18.

229. *See, e.g.*, Thompson v. Spitzer, 307 Cal. Rptr. 3d 183, 193 (Ct. App. 2023).

230. Mercer & Gabel, *supra* note 50, at 691. One scholar describes this phenomenon as "noble cause bias," which leads investigators "to feel that their objective is so worthy that they can break the rules in place to protect others." Smith, *supra* note 129. For a discussion of the policy implications of rogue databases, see *infra* Part IV.

231. *See Understanding Law Enforcement*, POL'Y CIRCLE, https://www.thepolicycircle.org/brief/understanding-law-enforcement [https://perma.cc/5MR7-NXZ4] ("State and local agencies make up the bulk of the almost 19,000 law enforcement agencies across the country, and local police departments employ the vast majority of all law enforcement officers, employing approximately 650,000 officers.").

232. *See infra* Section III.A.

233. *See infra* Section III.B.

A. Underregulated Rogue Databases Create Fourth Amendment Violations for Non-Offenders

Non-offenders have substantial privacy interests in their DNA, which outweigh government interests in creating far-reaching DNA databases. Although the *King* Court held that databasing the DNA of convicted offenders and arrestees is constitutional,[234] doing so with non-offender DNA is likely unconstitutional for several reasons. First, non-offenders do not have diminished expectations of genetic privacy like offenders do.[235] Second, the threat posed to non-offender privacy by rogue databases is more substantial than the threat posed to offender privacy by CODIS databases.[236] Third, government interests in maintaining a non-offender database are weaker than those for an offender database.[237] Fourth, the "consent" to perpetual storage of a voluntary sample from a donor should be invalidated on a public policy basis, reflecting both the scope of information contained in DNA[238] and the coercive and manipulative practices that may be occurring with rogue DNA databases.[239]

Unlike Alonzo King, non-offenders have no reason to expect that their privacy will be diminished. King placed himself under police scrutiny and arrest by threatening people with a shotgun.[240] Once he was arrested and in custody, he had notice that police were likely to intrude on his privacy.[241] The *King* majority seemed to hint that it would apply higher scrutiny to intrusions of privacy through "programmatic searches of either the public at large or a particular class of regulated but otherwise law abiding citizens."[242] Higher scrutiny is thus merited when non-offenders have no reason to believe that their cooperation with police will subject them to a lifetime of genetic surveillance and continuous comparison to DNA from unrelated crimes. In fact, with a lack of individualized suspicion for any crime at the time that the nonoffenders' DNA is entered into the database, their permanent inclusion in

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234. Maryland v. King, 569 U.S. 435, 465–66 (2013).

235. Mercer & Gabel, *supra* note 50, at 678, 680.

236. *Id.*

237. *Id.* at 658.

238. *See* Kelly Lowenberg, *Applying the Fourth Amendment When DNA Collected for One Purpose Is Tested for Another*, 79 U. CIN. L. REV. 1289, 1311, 1320–21 (2011).

239. *See generally* Johnson v. United States, 333 U.S. 10 (1948) (holding that, in order to protect an individual's privacy interests against intrusions by the state, a warrant is required before law enforcement may search an individual's premises).

240. Maryland v. King, 569 U.S. 435, 440 (2013).

241. *Id.* at 447.

242. *Id.* at 462.

the system and repeated comparison to forensic samples may constitute per se unreasonableness under *King*.[243]

Even if individualized suspicion is not required, the privacy interests at stake in rogue databases are likely substantial enough to outweigh any government interest in genetic surveillance of non-offenders. Unlike the CODIS regulated databases that the *King* Court contemplated, which could only access thirteen loci in an individual's genome,[244] rogue databases powered by modern DNA technology have access to the entire genome. The databased "genome contains a treasure trove of information about" its donor.[245] As described above, emerging phenotypic and behavioral analyses will provide police with highly detailed personal information. For non-offenders belonging to communities of color, police access to information about their race, sex, and behavioral disposition may create additional discrimination and subject them to further scrutiny by law enforcement.[246] Further, familial and genetic genealogy searches allow law enforcement to access a non-offender's entire family tree, to a degree where law enforcement may become more knowledgeable about a donor's family than the donor.[247] As will be discussed below, this type of search also implicates the third-party privacy interests of a non-offender's family members.

Although the *King* majority did not recognize that the thirteen DNA loci used at the time held more private information about an individual than their fingerprints,[248] it did recognize that Fourth Amendment privacy concerns may grow as science progresses.[249] A year after *King*, the Supreme Court ruled on another Fourth Amendment Case, *Riley v. California*, which concerned the privacy implications of a search of an arrestee's cellphone.[250] The Court determined that the digital search of the cellphone went far beyond a physical search, and violated the Fourth Amendment.[251] Its reasoning was predicated on the fact that "[t]he sum of an individual's private life can be reconstructed through a thousand photographs labeled with dates, locations, and descriptions."[252] The "immense storage capacity" of a cellphone[253] mirrors the

243. *See id.* at 462–64.

244. *Id.* at 445. CODIS could access only thirteen loci when *King* was decided but has now expanded to include twenty loci. Arnaud, *supra* note 39.

245. Roth, *supra* note 127, at 413.

246. *See* Oosthuizen & Howes, *supra* note 35, at 7–8.

247. *See id.*

248. *See King*, 569 U.S. at 459, 463–64.

249. *Id.* at 464.

250. 573 U.S. 373, 379 (2014).

251. *Id.* at 393, 403.

252. *Id.* at 394.

253. *Id.* at 393.

capacity of DNA for the storage of data and deeply personal information, which scientists have only just begun to unlock.[254] Thus, future Fourth Amendment DNA doctrine may need to change to capture the breadth of information that science will obtain from DNA.

Accepting *King* as good law and utilizing the analytical framework that it established, judicial recognition of this change would even further tip the scales established by the *King* court heavily in favor of non-offenders. Thus, prolific collection of non-offender DNA is likely unconstitutional under existing doctrine.

Government interests in rogue databases would have to be staggering to overcome the substantial privacy interests of non-offenders. However, "there is no corresponding governmental interest to verifying the identity and criminal history of an arrestee" in the context of non-offender databases.[255] Contrary to law enforcement agencies' push to collect as many individual samples as possible, research has shown that DNA databases produce more "hits" when police focus on collecting more crime scene samples to compare against existing convicted offender profiles.[256] Indeed, most hits come from convicted offenders.[257] Hits created with non-offender profiles are rare.[258] If anything, constantly testing non-offender databases is likely to slow testing of offender samples in active investigations and increase administrative costs.[259] These factors all suggest that the government interests in rogue databases is weak, and likely to be outweighed by the privacy interests of non-offenders. Therefore, searches of rogue databases likely constitute unreasonable, and thus unconstitutional, searches.

Local law enforcement will probably argue that it can collect consensually contributed DNA samples from non-offenders. Indeed, consent does generally waive Fourth Amendment requirements.[260] However, in the context of perpetual retention of DNA from non-offenders, "consent" would require that a non-offender contemplate every future search that the police will

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254. *See* Latchesar Ionkov & Bradley Settlemyer, *DNA: The Ultimate Data-Storage Solution*, SCI. AM. (May 28, 2021), https://www.scientificamerican.com/article/dna-the-ultimate-data-storage-solution [https://perma.cc/XV25-8U3J] (discussing the data storage capacity of DNA).

255. Mercer & Gabel, *supra* note 50, at 658.

256. Garrett & Murphy, *supra* note 100.

257. Roth, *supra* note 127, at 412.

258. *Id.*

259. Garrett & Murphy, *supra* note 100; *see* Kreag, *supra* note 8, at 1523.

260. Tibbetts, *supra* note 24, at 380; Kreag, *supra* note 8, at 1546.

conduct using their genetic material after providing it to the police.[261] This would mean that the scope of the non-offender's consent would have to include not only consent to revealing deeply personal information contained in their DNA (some of which they might not even be aware), but also to having their DNA constantly compared to that of perpetrators of unrelated crimes. Each subsequent comparison to forensic samples would likely constitute an additional warrantless search.[262] Many non-offenders likely give "consent" under duress—based on a desire to have their own case (or the case of a loved one) resolved; based on police coercion; based on police assertion of authority; or based on fear of becoming a suspect if they refuse to comply. For instance, people involved in "voluntary" DNA dragnets reported that "detectives tried to cajole, bully and threaten them into giving a DNA sample."[263] Further issues with consent are implicated when non-offenders' DNA is used to perform familial or genealogical searches, which, by their nature, should require third-party consent.[264] Regardless of the scope of an individual's consent to have their own DNA analyzed, it seems unreasonable to expect that anyone would grant law enforcement access to the DNA of all their relatives.

B. Familial DNA Searches as a Model of Unconstitutional Practices

Familial DNA searches provide an excellent model for these arguments. It is unclear exactly how many rogue databases use familial DNA, as very few state statutes regulate what types of searches can be performed in their databases—in fact, most only limit database use generally to "law enforcement identification purposes."[265] It is clear, however, that the ability to perform familial DNA testing was a motivator behind the establishment of rogue databases.[266] And the technique has proven to be very helpful. In a famous example, Dennis Rader—a prolific serial killer from Wichita,

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261. *But see* Kreag, *supra* note 8, at 1550 (suggesting that a non-offender's initial consent may be enough if law enforcement simply discloses their plans to add the sample to their database).

262. *See* Lowenberg, *supra* note 238, at 1319–20.

263. Ransom & Southall, *supra* note 13.

264. *See* Murphy, *supra* note 25, at 336–37, 337 n.178 (arguing that relatives "retain the full force of Fourth Amendment protection" in the context of familial DNA searches and databasing).

265. *See, e.g.*, KAN. STAT. ANN. § 21-2511(h)(2) (2024). *But see* LA. STAT. ANN. § 15:622.1 (2024) (limiting the use of DNA database testing by prohibiting the DNA investigation of "the victim of the sexually oriented criminal offense who submitted DNA if that victim is charged with or suspected of committing any criminal offense").

266. *See, e.g.*, Kreag, *supra* note 8, at 1532–33 (describing the motivation behind Arizona's rogue state database).

Kansas, known as BTK—was identified through a familial DNA search.[267] What is less well known, however, is that the familial search was conducted using a DNA specimen taken from his daughter's pap smear without her consent.[268]

The BTK case places the stunning power of familial DNA searches in stark contrast with the intimate nature of this method. In some cases, law enforcement has individualized suspicion for a suspect to whom they simply cannot gain access; familial searching allows them to pursue family members to confirm that the suspect is the actual contributor.[269] In other cases, law enforcement may use familial searches in conjunction with databasing to "put[] under suspicion people not already in the database" by gathering genetic information from non-offenders who have nothing to do with any criminal proceedings.[270]

Because the accuracy rates of familial searches are unknown, government interests in these searches are weaker than in traditional DNA analysis used to identify convicted offenders like King.[271] On the other hand, individual privacy interests are elevated as familial searches reveal more than identity—they reveal family relationships.[272] Among the other privacy risks for non-offenders discussed above, these searches may reveal the criminal status of family members, "unknown family links," and "the absence of family links," which may have significant interfamilial effects.[273] Each family search conducted using the DNA of a non-offender not only violates the privacy of that individual, but also of potential relatives.[274]

The disproportionate impact on privacy and discrimination when familial searches are used for investigation, rather than identification, indicates that these searches are likely to be unconstitutional when they involve the DNA of non-offenders. As will be discussed below, over-policed communities of

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267. Ellen Nakashima, *From DNA of Family, a Tool to Make Arrests*, WASH. POST (Apr. 21, 2008), https://www.washingtonpost.com/wp-dyn/content/article/2008/04/20/AR2008042002388_pf.html.

268. *Id.*

269. *See* Kreag, *supra* note 8, at 1532.

270. Murphy & Tong, *supra* note 11, at 1859–60; *see* Oosthuizen & Howes, *supra* note 35, at 7–8.

271. *See* Brendan I. Koerner, *Your Relative's DNA Could Turn You into a Suspect*, WIRED (Oct. 13, 2015), https://www.wired.com/2015/10/familial-dna-evidence-turns-innocent-people-into-crime-suspects [https://perma.cc/X738-DGAS].

272. *See* Lowenberg, *supra* note 238, at 1304 (describing the power of Y-STR familial testing).

273. Oosthuizen & Howes, *supra* note 35, at 7–8.

274. Murphy & Tong, *supra* note 11, at 1859–60.

color are already overrepresented in DNA databases.[275] Familial searches thus inherently place certain "class[es] of Americans under greater scrutiny merely because their relatives have committed crimes."[276]

IV. POLICY IMPLICATIONS OF UNCONSTITUTIONAL SEARCHES WITHIN "ROGUE" DNA DATABASES

Both the growth of rogue databases and the innovation of DNA have outpaced regulatory controls.[277] Without transparency from local law enforcement in most jurisdictions,[278] the combination of databases and invasive technology have created substantial policy risks for local communities whose members are included in rogue databases.[279] These risks fall into three general categories, as discussed in detail below: (1) imbalance of police power and personal privacy; (2) perpetuation of stereotypes involving race and criminality; and (3) increased surveillance of and violence toward women of color.

A. Striking a Balance Between Police Power & Personal Privacy

As with other forms of surveillance in the forensic context,[280] the increasing power of DNA may create substantial hardship for communities who are over-policed and under-protected.[281] As the police can retain more and more information about citizens, DNA will necessarily create shifts in the balance between police power and individual privacy interests.[282]

Using rogue databases, police in underregulated jurisdictions will have access to deeply personal information about individuals and families in their communities.[283] Some scholars are concerned that in extreme circumstances, police may leverage their access to private data to further extend their influence, beyond the traditional balance between police power and individual liberty.[284] This imbalance will likely lead to increased dignity costs for individuals who interact with police—both in the short term, caused by

275. *See id.* at 1894–95.
276. Nakashima, *supra* note 267.
277. *See* Tibbetts, *supra* note 24, at 382.
278. For a discussion of state database reporting requirements, see *infra* Section V.D.
279. *See* Tibbetts, *supra* note 24, at 382; Mercer & Gabel, *supra* note 50, at 642.
280. *See* Kreag, *supra* note 8, at 1529.
281. *See* Oosthuizen & Howes, *supra* note 35, at 2.
282. *Id.* at 8.
283. *See* Mercer & Gabel, *supra* note 50, at 692.
284. *See* Oosthuizen & Howes, *supra* note 35, at 2.

being stopped to provide a DNA sample, and in the long term, from being watched "based on law enforcement's belief that he or she will be a future criminal."[285]

The institutional issues that plague our criminal justice system are likely to be exacerbated by DNA database expansion, as those populations that have historically been over-policed and under-protected may become subject to underregulated "lifelong genetic surveillance."[286] Unchecked expansion of rogue databases may involve pretextual stops in some communities, to increase the genetic coverage of the population.[287] This may further decrease trust in law enforcement, even among those who do not frequently encounter police.[288]

B. Racially Biased Genetic Surveillance

Minority communities will likely be disproportionately affected by potential constitutional violations caused by underregulated rogue databases.[289] Racial disparities already exist within federally regulated DNA databases,[290] and the ability to add to these databases and conduct familial searches will likely perpetuate racial stereotypes and concepts of biological criminality.[291] Efforts to expand DNA databases will adversely affect communities that are already over-policed and under-protected by reinforcing "the idea of guilt by association, and disrupting family harmony as individuals" are investigated.[292]

In federally regulated databases, DNA samples from Black individuals are collected at least twice as often as samples from white individuals, representing a disproportionately greater percentage of the database than the general population.[293] Not only does this have significant social implications, but it is also likely to affect the accuracy of DNA matches. An individual's DNA is not being compared against a randomly selected sample—instead,

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285. Kreag, *supra* note 8, at 1498.

286. Mercer & Gabel, *supra* note 50, at 642.

287. *See* Kreag, *supra* note 8, at 1524.

288. *Id.* at 1492; Oscar Schwartz, *Do DNA Databases Make Would-Be Criminals Think Twice?*, UNDARK (Sept. 23, 2019), https://undark.org/2019/09/23/dna-database-deter-crime [https://perma.cc/KFR9-BGQA].

289. *See* Kreag, *supra* note 8, at 1524.

290. *See* Murphy & Tong, *supra* note 11, at 1894–95.

291. *See* Kreag, *supra* note 8, at 1535.

292. Aziza Ahmed, *Ethical Concerns of DNA Databases Used for Crime Control*, PETRIE-FLOM CTR.: BILL OF HEALTH (Jan. 14, 2019), https://blog.petrieflom.law.harvard.edu/2019/01/14/ethical-concerns-of-dna-databases-used-for-crime-control [https://perma.cc/7F4J-THFD].

293. Murphy & Tong, *supra* note 11, at 1894–95.

the match is made based on a skewed sample with a high concentration of samples from people of color.[294] Although states are subject to federal audits of their CODIS samples, very few states have any reporting requirements for database demographics,[295] and very little information is available about the racial composition of rogue databases.[296]

It remains likely, however, that over-policed and under-protected populations will continue to be overrepresented in DNA databases.[297] Because of DNA's hereditary nature and the potential for familial DNA searches within rogue databases, this problem will persist.[298] Individuals in these communities will continue to be subject to genetic surveillance based on their own or their family's interactions with law enforcement.[299] Thus, "while familial searching will affect the privacy rights of every person whose relative's DNA sample is on the DNA database, the threats to privacy will not be distributed equally throughout the population,"[300] particularly for non-offenders with relatively high privacy interests.

Another potential consequence of racially biased genetic surveillance is a chilling effect on crime reporting. If people of color fear having their DNA included in rogue databases, they may be less likely to report crimes—even when they are victims—to avoid an encounter with law enforcement that could result in permanent genetic surveillance of themselves and their family.[301] Without careful regulation to prevent inclusion of non-offender samples, states are likely to experience this chilling effect, particularly at the

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294. *Id.* at 1869.

295. *But see* 44 PA. CONS. STAT. § 2314(b)(1) (2024) (requiring demographic reporting for all DNA samples submitted from convicted offenders).

296. Mercer & Gabel, *supra* note 50, at 670.

297. *See* Oosthuizen & Howes, *supra* note 35, at 4. The expansion of DNA databases has met with this concern before. In anticipation of the *King* opinion, scholars were concerned that the inclusion of arrestees would exacerbate existing disparities in databases. Garrett & Murphy, *supra* note 100. Arrestee DNA slightly improved the disparity, as DNA from white arrestees was collected at higher rates than from convicted white individuals. Murphy & Tong, *supra* note 11, at 1896. Some proponents of DNA databasing even argue that a universal DNA database would alleviate some of the issues of institutionalized racism in the criminal justice system. *See, e.g.*, Kirsten Dedrickson, *Universal DNA Databases: A Way to Improve Privacy?*, 4 J.L. & BIOSCIS. 637 (2017) (arguing that a universal database would increase privacy protections, aid in exonerations, and improve crime deterrence). This argument does not seem to have drawn wide support in the legal community due to privacy concerns. *Id.* at 638.

298. *See* Murphy & Tong, *supra* note 11, at 1860.

299. *Id.*

300. Oosthuizen & Howes, *supra* note 35, at 4.

301. Mercer & Gabel, *supra* note 50, at 687; *see also* Kreag, *supra* note 8, at 1538 ("[I]ndividuals may conclude that it is unfair to make them submit to a lifetime of genetic surveillance in order for police to investigate the crime for which they were a victim. Some may refuse to report a crime so as to avoid being asked to provide a DNA sample.").

local level where citizens are most likely to encounter law enforcement.[302] For instance, if a woman—like Jane Doe from San Francisco—knew that police regularly retained victim DNA, she may never have reported her rape out of fear that her DNA would be used against her in the future.[303]

C. The "Dual Frustration" of Women of Color

Discussions of racial inequity "often fail to honor individuals' full senses of self when their subordination is based on the intersection of two or more protected categories."[304] For this reason, this Comment discusses individuals who are likely to be most affected by genetic surveillance, which, if underregulated, will serve as a means of targeted, institutionalized social control.[305]

The racial bias of genetic surveillance will disproportionately harm women of color who already balance the "dual frustration" of over-policing and under-protection.[306] These women are uniquely vulnerable to a "violence matrix"—that is, violence *within* their communities and police violence *against* their communities.[307] Although these women "want[] protection from neighborhood and gender-based violence," they "remain[] reluctant to enlist police assistance due to a history of racialized social control and police violence against themselves and their loved ones."[308] Even when police do offer help, women of color "fear . . . being labeled a 'race traitor'" against their community for enlisting police help and increasing the risk of police encounters.[309] Not only do women of color already bear "the brunt of neighborhood crime" but they also often feel responsible for managing the criminalization of their communities.[310] Therefore, these women must simultaneously manage victimization and criminalization for themselves and their communities, while also balancing a complicated relationship with local police.

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302. Mercer & Gabel, *supra* note 50, at 689; Kreag, *supra* note 8, at 1538.

303. Megan Cassidy, *S.F. Approves Measure to Prevent Police from Identifying Suspects Using Their Rape Exam DNA*, S.F. CHRON. (Apr. 19, 2022), https://www.sfchronicle.com/sf/article/S-F-approves-measure-to-prevent-police-from-17091891.php.

304. Stewart Chang et al., *Race & Gender & Policing*, 21 NEV. L.J. 885, 886 (2021).

305. *See id.* at 929.

306. Powell & Phelps, *supra* note 17, at 429.

307. *Id.* at 429–30.

308. *Id.* at 430.

309. *Id.* at 432.

310. *Id.* at 433, 436.

Now, because of rogue databases, women of color must also attempt to maintain control over their DNA. Fear of incriminating themselves or their loved ones for any past or future acts will make it even more difficult for women of color to go to the police for help.[311] In many over-policed communities, incrimination often carries a threat of potential lethal violence.[312] This fear became reality for the San Francisco Jane Doe introduced at the beginning of this Comment.[313] The same overreach that incriminated Jane Doe will extend to other women and their families.[314]

Women of color are more likely than their white counterparts to be stopped by police and treated as suspects, regardless of whether they are engaged in suspicious behavior.[315] Black women report that police treat them "[l]ike . . . the suspect" or "assume that [they are] the aggressor" even when they call the police for help.[316] As they are currently collected, crime reporting statistics do not reflect intersectionality with high resolution.[317] Statistics do reflect, however, that Black women are arrested twice as often as Latina women, and three times more often than white women.[318]

Pretextual stops may be used by police in jurisdictions with underregulated rogue databases as an excuse to collect DNA.[319] Women who attempt to stand up to the police—"disrupting traditional femininity tropes and asserting themselves against the 'masculine arm of the state'"—are more likely to be physically harmed or arrested.[320] Any such resistance to the

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311. *See* Chang et al., *supra* note 304, at 923.

312. *See id.*

313. *See generally* Second Amended Complaint for Damages & Injunctive Relief at 2–3, Doe v. City of San Francisco, No. 22-cv-05179, 2023 WL 3695544 (N.D. Cal. Feb. 10, 2023).

314. Mercer & Gabel, *supra* note 50, at 687.

315. Powell & Phelps, *supra* note 17, at 432, 439. About 44% of Black adults report being unfairly stopped by police, as compared to 9% of white adults. Drew Desilver et al., *10 Things We Know About Race and Policing in the U.S.*, PEW RSCH. CTR. (June 3, 2020), https://www.pewresearch.org/short-reads/2020/06/03/10-things-we-know-about-race-and-policing-in-the-u-s [https://perma.cc/D6DP-MACL]. Black men are far more likely to be unfairly stopped than Black women, with 59% and 31%, respectively, reporting unfair stops. *Id.*

316. Powell & Phelps, *supra* note 17, at 439–40.

317. *See Policing Women: Race and Gender Disparities in Police Stops, Searches, and Use of Force*, PRISON POL'Y INITIATIVE (May 14, 2019), https://www.prisonpolicy.org/blog/2019/05/14/policingwomen/#appendix [https://perma.cc/J77E-Z9MP].

318. *Id.*

319. Joh, *supra* note 16, at 285.

320. Powell & Phelps, *supra* note 17, at 443. *See generally* Frank Rudy Cooper, *"Who's the Man?": Masculinities Studies,* Terry *Stops, and Police Training*, 18 COLUM. J. GENDER & L. 671 (2009) (reflecting on the denigration of women, members of the LGBTQ community, and racial minorities produced by the commonly hypermasculine culture of American police); Andrea J. Ritchie, *#SAYHERNAME: Racial Profiling and Police Violence Against Black Women*, 41 N.Y.U.

police—even refusing to give a voluntary DNA sample when "randomly" stopped—could result in heightened suspicion and arrest.[321] Without more stringent state regulation, she could be forced to give up her DNA anyway.[322] Genetic surveillance will likely only worsen the perception of law enforcement as "illegitimate, unresponsive, and ill equipped to ensure public safety."[323]

Pressure from police, community members, neighbors, and loved ones would all be implicated in a police request for DNA from a woman of color. If rogue DNA databases remain largely underregulated, police could indefinitely keep her DNA. Through DNA surveillance of women of color (and of their communities at large), police may attempt to build a "modern equivalent of rogues galleries, . . . populated with DNA profiles from individuals police identify as potential *future* suspects."[324] This will deepen existing tensions, making it more difficult than ever for women of color to seek the help they need from local law enforcement.

V. STATUTORY REGULATIONS FOR ROGUE DATABASES

In response to potential constitutional violations and substantial public policy concerns for communities of color, states should amend their existing DNA database statutes. The example of familial DNA as a source of privacy violations for non-offenders and the intersectional lens of women of color demonstrate the need for increased regulation. Because the once-national system of DNA databases has become so fractured, states are likely the best forum for new legislation.

State and local law enforcement began their rogue databases because the federal system was not amenable to local needs.[325] This disharmony between the federal and state systems makes it difficult to assess the prevalence of constitutional violations in state and local governments. States should participate with CODIS and maintain their own databases, tailored to local law enforcement and democratically accountable to their citizens.[326]

REV. L. & SOC. CHANGE 187 (2016) (describing the gendered and often sexual violence experienced by Black women and LGBTQ people).

321. Mercer & Gabel, *supra* note 50, at 672.

322. Joh, *supra* note 16, at 292.

323. *See* David S. Kirk & Mauri Matsuda, *Legal Cynicism, Collective Efficacy, and the Ecology of Arrest*, 49 CRIMINOLOGY 443, 443 (2011) (finding that this type of legal cynicism can lead to flourishing crime rates).

324. Kreag, *supra* note 8, at 1534 n.243.

325. Goldstein, *supra* note 18.

326. *See* Murphy & Tong, *supra* note 11, at 1894.

Variation in policies between states already exists. For instance, although *King* granted the states leeway to include arrestees, many still do not submit arrestee profiles to the CODIS system.[327] The fact that states diverge on the propriety of databasing arrestee DNA, even after the practice was found constitutional, reveals that regulatory decisions are already state-specific.

Interestingly, however, most states which refrain from submitting arrestee profiles do not have statutes that explicitly exclude them from the state databases.[328] The apparent disconnect between the language of statutes and the actual practices of state and local law enforcement leaves a troubling gap in regulation. Local databases may be using practices that directly contradict the intent of their state legislatures without necessarily violating the statute—leaving non-offenders' DNA stuck in rogue databases with no state oversight to prevent constitutional violations.[329] States should explicitly require local databases to comply with statewide database policies and regulations.[330]

There are several key statutory provisions that states should enact to prevent constitutional violations of non-offenders' Fourth Amendment rights: (1) excluding non-offender DNA from permanent retention in the database; (2) restricting permissible uses of DNA testing; (3) creating automatic expungement provisions; (4) requiring annual reporting and oversight; and (5) establishing an exclusionary remedy for evidence collected because of erroneous inclusion or failure to expunge.[331]

A. Exclusion of Non-Offenders

First, non-offenders' samples should be explicitly excluded from databases after the conclusion of criminal proceedings for which their sample was collected. Individuals who are not offenders have a higher privacy interest in their own DNA than offenders. As discussed above, this privacy expectation, coupled with the extensive amount of information contained in DNA, should prevent the unconstitutional storage of non-offender DNA samples or the comparison of their samples to crime scene material. Because

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327. *See* FBI, *supra* note 9.

328. *But see, e.g.*, VT. STAT. ANN. tit. 20, § 1938 (2024) (explaining how databasing is only allowed for DNA samples collected from certain convicted offenders and all other samples cannot be databased after the conclusion of related criminal proceedings).

329. *See* Kreag, *supra* note 8, at 1498 ("The current reliance on self-regulation is not sufficient.").

330. Mercer & Gabel, *supra* note 50, at 692–93.

331. These suggestions focus mainly on the protection of non-offenders' rights, but states may still legislate increased protections for any class of individuals, including arrestees. *See, e.g.*, FBI, *supra* note 9.

of the complications arising from consent to the search of heritable genetic material, even non-offenders who consent to having their DNA sample taken should not have their samples retained in perpetuity.

To prevent constitutional violations, state statutes and regulations should explicitly exclude non-offender DNA. For example, in Oklahoma, any DNA sample that was not collected from a convicted offender or collected after a valid arrest, a finding of probable cause, a failure to appear after conditional release, or a plea agreement cannot be analyzed and must be destroyed.[332] By requiring some degree of individualized suspicion for non-offenders, states can help protect their citizens from unjustified genetic surveillance.[333]

B. Permissible DNA Testing

Collecting one individual's DNA inherently includes collecting genetic materials of others. The heritable nature of DNA makes DNA testing incredibly powerful. Most states do not explicitly prohibit familial or genealogical testing,[334] but some do explicitly prohibit physical trait testing.[335]

States should generally prohibit familial and genealogical testing of non-offender DNA samples. Testing for medical conditions and physical characteristics should be similarly proscribed.[336] Although these tests may be appropriate in cases where law enforcement can establish probable cause and obtain warrants with sufficient particularity, they should not be used indiscriminately.[337]

Further limitations should be put in place to prevent inappropriate comparisons between temporarily held DNA samples, such as those voluntarily provided by victims or relatives and casework samples collected from crime scenes. New Mexico's DNA database statutes explicitly prohibit

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332. OKLA. STAT. tit. 74, § 150.27a(A)(3) (2024).

333. Proper exclusion from permanent retention in a database will also rely on the state's expungement procedures, which will be discussed *infra* Section V.C.

334. Wyoming, unlike other states, provides statutory guidance for the use of genealogical testing. WYO. STAT. ANN. § 35-32-102 (2024).

335. *Id.* § 7-19-404 (2024); Cino, *supra* note 47, at 411.

336. *See, e.g.*, 12 R.I. GEN. LAWS § 12-1.5-10 (2024). Although not currently in use, future behavioral genetic techniques should also likely be prohibited by state statute. *See* Oosthuizen & Howes, *supra* note 35, at 8.

337. Conducting these tests may be permissible by warrant. *See* Lowenberg, *supra* note 238, at 1322. But the execution of such warrants will likely depend on the applicability of the Fourth Amendment to subsequent DNA comparisons. *See, e.g.*, State v. Mitcham, 535 P.3d 948, 959 (Ariz. Ct. App. 2023) (Catlett, J., concurring) (questioning whether the creation of a DNA profile from a blood sample and subsequent comparisons using that sample constitute a search covered by the Fourth Amendment).

searches that compare the DNA of unidentified persons or relatives of missing persons to "evidentiary samples resulting from criminal investigations."[338] Similar statutes would allow police to temporarily retain non-offender DNA necessary for investigations while simultaneously preventing inappropriate searches against crime scene DNA.

C. Automatic Expungement

All states currently have an expungement provision in their statutes as any state that participates with CODIS is required to have one.[339] However, most states only allow expungement upon written request by offenders, supplemented by a court order demonstrating that their conviction was overturned or their charges dismissed.[340] Most do not have a specific provision for non-offender expungement which would allow them "to reclaim their genetic privacy."[341] If an individual does not petition for expungement, law enforcement can store their DNA in perpetuity and use it for future searches.[342]

By requiring databases to label all DNA samples with reference to a specific crime under active investigation, states can easily ensure that any inactive records will be expunged.[343] This requirement would also ensure that DNA belonging to non-offenders will not be retained in violation of the Fourth Amendment.

The state, prosecuting agency, or police—not non-offenders—should bear the procedural burden required to remove DNA from the database. After the conclusion of the criminal proceeding for which the non-offender provided their DNA sample, their DNA should be automatically expunged.[344] The same automatic expungement should apply for offenders whose convictions are reversed, whose charges are dismissed, or for whom charges are never brought.[345]

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338. N.M. STAT. ANN. § 29-16-8.1 (2024).

339. Roth, *supra* note 127, at 426.

340. *See, e.g.*, IDAHO CODE § 19-5513 (2024); ALASKA STAT. § 44.41.035(i) (2024); CONN. GEN. STAT. § 54-102l (2023).

341. Koerner, *supra* note 271.

342. Tibbetts, *supra* note 24, at 382.

343. *See, e.g.*, 730 ILL. COMP. STAT. 5/5-4-3 (2024).

344. Mercer & Gabel, *supra* note 50, at 694 ("Once a case is closed, there should be no legitimate law enforcement reason for retaining the sample beyond the specific context of the investigation for which the sample was drawn, analyzed, and centralized.").

345. *See, e.g.*, VT. STAT. ANN. tit. 20, § 1940 (2024) (automatic expungement after reversal, dismissal, or pardon); UTAH CODE ANN. § 53-10-406(1)(h) (West 2024) (automatic expungement

A similar provision was found in the Maryland statute that the Court analyzed in *Maryland v. King* for arrestees.[346] The statute stated that if "all qualifying criminal charges are determined to be unsupported by probable cause . . . the DNA sample shall be immediately destroyed."[347] Samples were also destroyed if the person was not convicted.[348]

D. Annual Reporting and Oversight

A lack of transparency in rogue databases currently obfuscates any potential constitutional violations. And it prevents meaningful legislative oversight over the exercise of police power to protect inappropriate privacy violations.[349] Monitoring minimizes unnecessary privacy intrusions, decreases the likelihood of biased application of DNA testing, and ensures compliance with statutes.[350]

Very few states have any reporting or oversight provisions. States should establish mandatory reporting laws for both state and local databases to either a DNA Databases commission,[351] the legislature,[352] or the governor.[353] These reports should include demographic information on individuals whose DNA is explicitly authorized for inclusion in the database and the disposition of their cases;[354] the number of searches conducted and to what end;[355] and details of expungements. States should use these statistics and any other requisite information to ensure that any DNA database operating in the state complies with statutory requirements. Following a system like that established in New York, oversight committees could monitor for Fourth Amendment violations and strip accreditation from labs that are unwilling to

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of suspect's DNA after ninety days if no charges are brought); OKLA. STAT. tit. 22, § 210 (2024) (automatic expungement if charges are never brought, voluntarily dismissed by the state, dismissed by the court, or when the statute of limitations runs).

346. 569 U.S. 435, 443 (2013).

347. MD. CODE ANN., PUB. SAFETY § 2-511 (West 2024) (automatic expungement within sixty days from all databases).

348. *Id.*

349. Mercer & Gabel, *supra* note 50, at 681.

350. Kreag, *supra* note 8, at 1499.

351. N.Y. EXEC. LAW § 995-A (Consol. 2024) (creating a DNA commission to oversee all accreditation for forensic laboratories in the state, including annual recertification requirements).

352. N.C. GEN. STAT. § 15A-266.5 (2024) (establishing annual reporting to the Joint Legislative Oversight Committee on Justice and Public Safety).

353. *See, e.g.*, 44 PA. CONS. STAT. § 2314(b)(1) (2024) (requiring the commissioner to send an annual report to the governor).

354. Mercer & Gabel, *supra* note 50, at 696.

355. Koerner, *supra* note 271.

comply. Reporting would also allow states to evaluate both the efficacy of use and the success of policy goals.

E. Exclusionary Rule

Very few states provide any remedy for individuals whose samples are misused.[356] In fact, of the states that do address matches made using DNA that is erroneously included in databases, most allow law enforcement to use these matches as a valid basis for arrest or conviction.[357] For example, in Florida, a DNA match on its own is sufficient to establish probable cause.[358]

North Carolina, however, has a strong provision to protect individuals from prosecution based on the invalid inclusion of DNA in a database.[359] The statute provides that "[a]ny identification, warrant, probable cause to arrest, or arrest based upon a database match . . . shall be invalid and inadmissible in the prosecution of the defendant for any criminal offense."[360] Under this statute, any DNA that is no longer validly within the state's database must be removed within 120 days.[361]

The Exclusionary Rule of the Fourth Amendment is a significant deterrent for police misconduct.[362] It should be applied to evidence obtained via improper inclusion of non-offender samples in DNA databases or failure to expunge.[363] Non-offender DNA that is not properly and promptly removed from the database should not be admissible, and cannot serve as the basis of an arrest, confinement, or conviction.

To increase the uniformity of DNA databasing within each state, state legislatures should modify their existing DNA databasing statutes to avoid Fourth Amendment violations. Although some states already offer substantial guidance on databasing, most do not require that local databases meet or exceed the standards that state statutes impose, only requiring CODIS compatibility. Thus, local databases, and even state databases that are not integrated with the federal CODIS system, are not being held accountable. Limiting whose DNA can be permanently retained, how it can be used, and for how long will go a long way to prevent Fourth Amendment violations.

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356. Lowenberg, *supra* note 238, at 1324.

357. *See, e.g.*, KAN. STAT. ANN. § 21-2511(*l*) (2024).

358. FLA. STAT. § 943.325 (2024).

359. N.C. GEN. STAT. § 15A-266.3A (2024).

360. *Id.*

361. *Id.*

362. *See* Yale Kamisar, *How We Got the Fourth Amendment Exclusionary Rule and Why We Need It*, CRIM. JUST. ETHICS, Summer/Fall 1982, at 4, 9–11.

363. Lowenberg, *supra* note 238, at 1325.

But without provisions for oversight and for the exclusion of evidence found in violation of these limits, state regulation will continue to be meaningless.

VI. CONCLUSION

Forensic DNA has revolutionized law enforcement and criminal law. It allows law enforcement to solve crimes with biological precision—identifying perpetrators and excluding the innocent. It has spurred an evidentiary revolution in the legal field, forcing us to recognize the importance of scientific rigor in the courtroom.

But DNA innovation consistently outpaces legal understanding. This disconnect has left several doctrinal questions—such as whether subsequent DNA analyses are searches—unanswered. At the intersection between law and science lies significant potential for the violation of constitutional rights.

Underregulated rogue databases take advantage of this unease. Although many local databases have self-imposed standards, the standards are unclear to the public, and may even be unclear to the states themselves, making it difficult to evaluate their constitutionality. The creation of CODIS and early DNA databases sparked concern amongst legal scholars who feared that genetic surveillance may compromise Fourth Amendment privacy interests. The federal regulation put in place to avoid these pitfalls seems effective on the national scale, but local practices diverge.

Local law enforcement's frustration with a national approach to DNA databasing is justified. Although the national system allows for a network of genetic data exchange, the federal regulations are not conducive to local problems. So local law enforcement agencies have created their own databases.

State-level regulation will allow states to tailor databases to their own law enforcement needs and provide detailed oversight to prevent constitutional violations. Government interests in crime prevention do not outweigh non-offenders' interest in their genetic privacy. Unlike offenders, non-offenders' actions do not subject them to criminal scrutiny or the resulting diminution of privacy expectations. Furthermore, DNA is individualizing and heritable. Not only does its inclusion in a database infringe on the privacy of the non-offender, but reaches further into their family tree, creating genetic surveillance of many individuals at once.

These threats are imminent for communities of color which already endure complicated and tense relationships with law enforcement. Women in these communities are affected by a "violence matrix" caused by over-policing and under-protection. Potential exposure of loved ones' DNA through a chance

encounter with police worsens complex, intersectional challenges and may have adverse lasting impacts on theories of the biology of criminality.

Underregulated use of rogue DNA databases will continue to facilitate Fourth Amendment violations. Databasing the DNA of non-offenders without their knowledge is unjustifiable and fails to contemplate the adverse effects. If left to expand unchecked, the databases will harm community-police relationships and chill crime reporting as citizens will fear exposing themselves and their families to genetic surveillance. States must act, not only to prevent unconstitutional practices that perpetuate racial/ethnic, gender, and social inequities, but also to maintain the legitimacy of police and forensic DNA.

DNA technology will continue to be an essential tool to prevent and detect crime. States should not allow unconstitutional practices with non-offender DNA to tarnish the legitimacy of DNA technology or of their police forces. States should update their existing DNA databasing statutes to include specific regulations that will prevent the abuse of genetic information and the violation of individual rights of non-offenders.