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DNA Evidence: Brave New World, Same Old Problems

By Ken Strutin (<http://www.llrx.com/authors/960>), Published on October 14, 2013

The backbone of investigative forensics in the 21st Century is the database.¹

([features/dnaevidence.htm#_ftn1](http://www.llrx.com/features/dnaevidence.htm#_ftn1))

And of all information gathering techniques, genetic databanking has become the holy grail of prosecutions and the last resort for exonerations. It is both the cause of and solution to many problems in the administration of justice. Thus, DNA forensics highlights the longstanding tension between scientific understanding and legal reasoning.

While DNA's scientific reputation is very near to magic, its forensic applications are subject to the faults and limitations of every kind of evidence offered as proof in a court of law.

This article collects research on the law and science of genetic evidence at the pre-conviction stage. Thus, it focuses on the role of DNA in identification, investigation and prosecution of crime, social and privacy issues, and to some degree exculpation or evidence of third party culpability.² ([features/dnaevidence.htm#_ftn2](http://www.llrx.com/features/dnaevidence.htm#_ftn2))

BOOKS

[Advanced Topics in Forensic DNA Typing](http://www.sciencedirect.com/science/book/9780123745132) (<http://www.sciencedirect.com/science/book/9780123745132>) (Elsevier 2012) (vol. 2)

"Since the second edition of *Forensic DNA Typing* was written in 2004, a great deal has happened in the field of forensic DNA analysis. Hence, the need to update the information contained in the book in as comprehensive a manner as possible. In forensic science review articles published in 2005, 2007, and 2009 in the journal *Analytical Chemistry*, I [[John M. Butler](http://www.cstl.nist.gov/strbase/butler.htm) (<http://www.cstl.nist.gov/strbase/butler.htm>)] briefly described topics from hundreds of articles published during the time frame of 2003–2008. In my own laboratory at the National Institute of Standards and Technology (NIST), we have published over 75 articles since 2004 on a variety of subjects including miniSTRs, Y-STRs, mtDNA, SNPs, validation, and DNA quantitation (see <http://www.cstl.nist.gov/biotech/strbase/NISTpub.htm> (<http://www.cstl.nist.gov/biotech/strbase/NISTpub.htm>))."

[Double Helix and the Law of Evidence](http://www.hup.harvard.edu/catalog.php?isbn=9780674035881) (<http://www.hup.harvard.edu/catalog.php?isbn=9780674035881>) (Harv. U. Press 2010)

"In a history both scientifically sophisticated and comprehensible to the nonspecialist, [David H. Kaye](http://law.psu.edu/faculty/resident_faculty/kaye) (http://law.psu.edu/faculty/resident_faculty/kaye) weaves together molecular biology, population genetics, the legal rules of evidence, and theories of statistical reasoning as he describes the struggles between prosecutors and defense counsel over the admissibility of genetic proof of identity. Combining scientific exposition with stories of criminal investigations, scientific and legal hubris, and distortions on all sides, Kaye shows how the adversary system exacerbated divisions among scientists, how lawyers and experts obfuscated some issues and clarified others, how probability and statistics were manipulated and misunderstood, and how the need to convince lay judges influenced the scientific research. Looking to the future, Kaye uses probability theory to clarify legal concepts of relevance and probative value, and describes alternatives to race-based DNA profile frequencies."

Forensic DNA Evidence Interpretation (<http://www.crcpress.com/product/isbn/9780849330179>) (CRC Press 2004)

"Forensic DNA Evidence Interpretation is the most comprehensive resource for DNA casework available today. Written by leaders in the fields of biology and statistics, the book emphasizes the interpretation of test results and provides the necessary formulae in an easily accessible manner.

The book begins by reviewing all pertinent biology, and then provides information on every aspect of DNA analysis, including modern interpretation methods and issues, and contemporary population genetic models available for estimating DNA frequencies or likelihood ratios. Following a chapter on procedures for validating databases, the text presents overviews and performance assessments of both modern sampling uncertainty methods and current paternity testing techniques. Later chapters discuss the latest methods for mixture analysis, LCN (ultra trace) analysis, and non-autosomal (mito, X, and Y) DNA analysis. The text concludes with procedures for disaster victim identification and information on DNA intelligence databases. Supported by numerous tables and over 800 references, this authoritative book provides a link among the biological, forensic, and interpretative domains of the DNA profiling field. It is a valuable resource that allows forensic scientists and technicians, molecular biologists, and attorneys to use forensic DNA evidence to its greatest potential."

Fundamentals of Forensic DNA Typing (<http://www.sciencedirect.com/science/book/9780123749994>) (Elsevier 2010) (vol. 1)

"This book will examine the science of current forensic DNA typing methods by focusing on the biology, technology, and genetic interpretation of short tandem repeat (STR) markers, which encompass the most common forensic DNA analysis methods used today. The materials in this book are intended primarily for two audiences: (1) students learning about forensic DNA analysis in an academic environment and (2) forensic science professionals and members of the law enforcement and legal communities who want to gain a better understanding of the fundamentals behind STR typing. Further information on each of the subjects presented here is available in the second volume, **Advanced Topics in Forensic DNA Typing** (<http://www.sciencedirect.com/science/book/9780123745132>) , 3rd Edition."

Genetic Justice: DNA Data Banks, Criminal Investigations, and Civil Liberties (<http://www.cup.columbia.edu/book/978-0-231-14520-6/genetic-justice>) (Colum. U. Press 2010)

"Two leading authors on medical ethics, science policy, and civil liberties take a hard look at how the United States has balanced the use of DNA technology, particularly the use of DNA databanks in criminal justice, with the privacy rights of its citizenry. [Sheldon] **Krimsky** (<http://www.tufts.edu/~skrimsky/>) and [Tania] **Simoncelli** (<https://www.aclu.org/blog/author/tania-simoncelli>) analyze the constitutional, ethical, and sociopolitical implications of expanded DNA collection in the United States and compare these findings to trends in the United Kingdom, Japan, Australia, Germany, and Italy. They explore many controversial topics, including the legal precedent for taking DNA from juveniles, the search for possible family members of suspects in DNA databases, the launch of "DNA dragnets" among local populations, and the warrantless acquisition by police of so-called abandoned DNA in the search for suspects. Most intriguing, Krimsky and Simoncelli explode the myth that DNA profiling is infallible, which has profound implications for criminal justice."

Immortal Life of Henrietta Lacks (<http://www.broadwaybooks.net/book/9781400052189>) (Broadway Books 2010)

"Her name was Henrietta Lacks, but scientists know her as HeLa. She was a poor Southern tobacco farmer who worked the same land as her slave ancestors, yet her cells—taken without her knowledge—became one of the most important tools in medicine. The first "immortal" human

cells grown in culture, they are still alive today, though she has been dead for more than sixty years. If you could pile all HeLa cells ever grown onto a scale, they'd weigh more than 50 million metric tons—as much as a hundred Empire State Buildings. HeLa cells were vital for developing the polio vaccine; uncovered secrets of cancer, viruses, and the atom bomb's effects; helped lead to important advances like in vitro fertilization, cloning, and gene mapping; and have been bought and sold by the billions. . . .

Now [Rebecca Skloot](http://rebeccaskloot.com/) (<http://rebeccaskloot.com/>) takes us on an extraordinary journey, from the "colored" ward of Johns Hopkins Hospital in the 1950s to stark white laboratories with freezers full of HeLa cells; from Henrietta's small, dying hometown of Clover, Virginia—a land of wooden slave quarters, faith healings, and voodoo—to East Baltimore today, where her children and grandchildren live and struggle with the legacy of her cells.

Henrietta's family did not learn of her "immortality" until more than twenty years after her death, when scientists investigating HeLa began using her husband and children in research without informed consent. And though the cells had launched a multimillion-dollar industry that sells human biological materials, her family never saw any of the profits. As Rebecca Skloot so brilliantly shows, the story of the Lacks family—past and present—is inextricably connected to the dark history of experimentation on African Americans, the birth of bioethics, and the legal battles over whether we control the stuff we are made of."

[Molecular Photofitting: Predicting Ancestry and Phenotype Using DNA](http://www.sciencedirect.com/science/book/9780120884926) (<http://www.sciencedirect.com/science/book/9780120884926>) (Elsevier 2008)

"This textbook is meant to serve less as an instructive tool for the classroom and more as a reference for the forensic, clinical, and academic scientist. It is my [Tony N. Frudakis] hope that scientists seeking to develop or use methods for the inference of phenotype from DNA will find some of the ideas presented here useful."

[Race and the Genetic Revolution: Science, Myth, and Culture](https://cup.columbia.edu/book/978-0-231-15696-7/race-and-the-genetic-revolution) (<https://cup.columbia.edu/book/978-0-231-15696-7/race-and-the-genetic-revolution>) (Columbia University Press 2011)

"Do advances in genomic biology create a scientific rationale for long-discredited racial categories? Leading scholars in law, medicine, biology, sociology, history, anthropology, and psychology examine the impact of modern genetics on the concept of race. Contributors trace the interplay between genetics and race in forensic DNA databanks, the biology of intelligence, DNA ancestry markers, and racialized medicine. Each essay explores commonly held and unexamined assumptions and misperceptions about race in science and popular culture.

This collection begins with the historical origins and current uses of the concept of "race" in science. It follows with an analysis of the role of race in DNA databanks and racial disparities in the criminal justice system. Essays then consider the rise of recreational genetics in the form of for-profit testing of genetic ancestry and the introduction of racialized medicine, specifically through an FDA-approved heart drug called BiDil, marketed to African American men. Concluding sections discuss the contradictions between our scientific and cultural understandings of race and the continuing significance of race in educational and criminal justice policy."

BOOK CHAPTERS

"DNA and the Fifth Amendment (<http://ssrn.com/abstract=1823722>) " in *The Political Heart of Criminal Procedure: Essays on Themes of William J. Stuntz* (<http://www.cambridge.org/us/academic/subjects/law/criminal-law/political-heart-criminal-procedure-essays-themes-william-j-stuntz>) (Cambridge

U. Press 2012)³ (features/dnaevidence.htm#_ftn3)

"Challenges to the collection and databasing of DNA samples almost always proceed under the Fourth Amendment. The Fifth Amendment is rarely considered a viable legal claim, largely due to the longstanding distinction between testimonial evidence, which receives Fifth Amendment protection, and non-testimonial evidence, which does not. In this short essay, written as a chapter in a book celebrating the life and work of Professor William J. Stuntz, I [Erin Murphy (<https://its.law.nyu.edu/facultyprofiles/profile.cfm?personID=31567>)] draw upon *United States v. Hubbell* as a means of arguing that the Fifth Amendment might in fact cover certain kinds of DNA investigative activity. Specifically, I analogize a requirement to produce documents otherwise unknown to investigators, which the Court found to constitute self-incrimination, to a requirement that defendants provide a DNA sample not to match a specific crime scene, but so that investigators can compile DNA databases to troll for matches. In both cases, the concern is that investigators compel information from a suspect in order to create rather than confirm suspicion, and thus the Fifth Amendment ought to apply."

"Forensic DNA Evidence: The Myth of Infallibility (<http://ssrn.com/abstract=2214379>)" in *Genetic Explanations: Sense and Nonsense* (<http://www.hup.harvard.edu/catalog.php?isbn=9780674064461>) (Harv. U. Press 2013)

"In this chapter I will challenge the assumption that DNA tests are infallible. I [William C. Thompson (<http://socialecology.uci.edu/faculty/wcthoms>)] will show that errors in DNA testing occur regularly and that DNA evidence has falsely incriminated innocent people, causing false convictions. Although I agree with the 2009 NRC report's conclusion that DNA testing rests on a stronger scientific foundation than most other forensic science disciplines, I will argue that many of the problems identified in the NRC report also apply to DNA evidence. In particular, DNA analysts take inadequate steps to avoid bias and to assess the risk of error, and they frequently overstate the statistical value of test results. Although DNA tests undoubtedly incriminate the correct person in the great majority of cases, the risk of false incrimination is high enough to deserve serious consideration in public policy debates, particularly in debates about expansion of DNA databases and debates about the need for governmental oversight of forensic laboratories. My key point is that the risk of error is higher than it needs to be. I will argue that forensic laboratories often compromise scientific rigor and quality control in order to achieve other goals, and they sometimes suppress evidence of problems in order to protect their credibility and maintain the public perception of DNA's infallibility."

"Reference Guide on DNA Identification Evidence ([http://www.fjc.gov/public/pdf.nsf/lookup/SciMan3D06.pdf/\\$file/SciMan3D06.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/SciMan3D06.pdf/$file/SciMan3D06.pdf))" in *Reference Manual on Scientific Evidence* (http://www.fjc.gov/library/fjc_catalog.nsf/autoframepage?openform&url=/library/fjc_catalog.nsf/bysubjectfrm?openform&category=Scientific+Evidence) (FJC 2011)

"This reference guide addresses technical issues that are important when considering the admissibility of and weight to be accorded analyses of DNA, and it identifies legal issues whose resolution requires scientific information. The goal is to present the essential background information and to provide a framework for resolving the possible disagreements among scientists or technicians who testify about the results and import of forensic DNA comparisons."

LAW REVIEWS

[Affects of Apprendi v. New Jersey on the Use of DNA Evidence at Sentencing-Can DNA Alone Convict of Unadjudicated Prior Acts](http://scholarlycommons.law.wlu.edu/cgi/viewcontent.cgi?article=1278&context=crsj&sei-redir=1&referer=http%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3Daffected%2520of%2520apprendi%2520v.%2520can%2520dna%2520alone%2520convict%2520of%2520unadjudicated%2520prior%2520acts%26source%3Dv) (<http://scholarlycommons.law.wlu.edu/cgi/viewcontent.cgi?article=1278&context=crsj&sei-redir=1&referer=http%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3Daffected%2520of%2520apprendi%2520v.%2520can%2520dna%2520alone%2520convict%2520of%2520unadjudicated%2520prior%2520acts%26source%3Dv>)

[can%20dna%20alone%20convict%20unadjudicated%20prior%20acts%22](#)) ?, 17 Wash. & Lee J. Civil Rts. & Soc. Just. 267 (2010)

"This Note contemplates that in light of Apprendi and its progeny, a DNA database match should be viewed as an additional fact that must be proved beyond a reasonable doubt by a jury if enhancing the punishment beyond the prescribed statutory maximum. And in states with wide sentencing ranges, DNA evidence of an unadjudicated crime must meet at least a preponderance of the evidence burden of proof to assure a defendant's right not to be sentenced with insufficient evidence. Part I outlines the changes in sentencing jurisprudence since Apprendi and the Court's recognition that constitutional rights of defendants exist at sentencing. Part II.A introduces the standards of DNA admission at trial as a starting point for finding appropriate evidentiary limitations on DNA admission at sentencing. Part II.B examines the limited precedent available on using DNA evidence alone to convict and proposes that doing so requires an initial finding of a DNA random match probability of 1 in 1,000. Part III contends that a defendant continues to have constitutional due process rights at sentencing which require DNA matches to unadjudicated offenses pass a process of reliability verification, equivalent to at least a preponderance of the evidence standard."

[Applying the Fourth Amendment When DNA Collected for One Purpose Is Tested for Another](#) (<http://scholarship.law.uc.edu/cgi/viewcontent.cgi?article=1010&context=uclr&sei-redir=1&referer=http%3A%2F>

[%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3Dapplying%2520the%2520fourth%2520amendrNgUUrC8E6aAygGG3YDgCA%26usg%3DAFQjCNE5juEy3AFfDrRsY6JtMdqIPWtWRw%26bvm%3Dbv.50952](#) , 79 U. Cin. L. Rev. 1289 (2011)

"Deoxyribonucleic acid (DNA) contains sensitive information about a person's identity, family, and medical risks. As our understanding of genetics improves, DNA that was originally collected by the government for one purpose is becoming useful for other purposes. Some states are now testing DNA originally collected for identification or medical screening for other purposes, including research and determining whether two people are related. Once the government has taken and tested your DNA, what else can the government reasonably do with it? While others have discussed how the Fourth Amendment limits the initial DNA collection and testing, this Article is the first to examine how the Fourth Amendment applies when these DNA samples are tested for new information.

Because DNA contains a vast amount of information in a microscopic space, rules that traditionally restrict government conduct might be insufficient to establish appropriate limits on how DNA can be analyzed. Drawing on computer-search law in which courts address similar problems, this Article proposes that the Fourth Amendment be applied to focus on what information has been exposed rather than whether a physical zone has been penetrated. This approach would require a warrant or an applicable warrant exception before a DNA sample could be retested for additional genetic information. Applying the Fourth Amendment to DNA testing in this manner is doctrinally supported and strikes the best balance between allowing the government to analyze stored DNA for new purposes when necessary and protecting genetic information from being unreasonably revealed."

[Art in the Science of DNA: A Layperson's Guide to the Subjectivity Inherent in Forensic DNA Typing](#) (<http://ssrn.com/abstract=1753906>) , 58 Emory L.J. 489 (2008)

"DNA typing is typically held out as the pinnacle of "good" forensic evidence, in that it exemplifies the kind of scientific rigor that first-generation techniques lack. And, without question, this praise is well-deserved. DNA typing represents a marked advance beyond the shamanistic "sciences" of the first generation. Yet the seeming corollary - that DNA typing is therefore an exercise in purely objective, indisputable science - does not hold true. This is not to suggest that DNA has

no basis in objective science, or even that it is as subjective as other forensic techniques; comparing most first-generation methods to DNA typing is like comparing astrology to neuroscience. Nevertheless, not unlike neuroscience, the fact that DNA typing is scientifically grounded does not mean that there are not plenty of things that we still do not understand about it, and plenty of instances in which the best conclusions we can draw are nonetheless tentative ones. To be clear, I [Katharine C. Lester (<http://www.rlf.com/Lawyers/KatharineCLester>)] am not saying that DNA typing done poorly entails an exercise of subjective judgment. Rather, DNA typing - done perfectly and precisely according to protocol - still often entails making discretionary calls and choices. But just because DNA typing is not wholly objective does not mean that it is wholly indeterminate - it simply means that it may be more like meteorology than mathematics. This Article explains, in what I hope is accessible language, some of the subjective discretion involved in forensic DNA typing."

Behavioral Genetics Research and Criminal DNA Databanks (<http://ssrn.com/abstract=1411861>), 69 Law & Contemp. Probs. 259 (2006)

"This article examines the current concerns about whether DNA databases may be used for actions other than to apprehend criminals, such as genetic research, in particular, searching for a "crime gene". Part II considers the perspective that these databases may be useful for research. The information within a DNA sample consists of a limited number of DNA base-pair variations, which are important to identification, but not necessarily to genetic research. However, while it may be difficult to conduct genetic research, it is not impossible. Part III examines state and federal database legislation. There are examples of three states' statutes and how they are falsely portrayed or exaggerated as allowing DNA databases to be used for genetic research. Part IV assesses some arguments with regard to allowing this research, including lack of consent from "donors", and the issue of whether or not to save the DNA samples once they have been used for identification."

Better Balancing: Reconsidering Pre-Conviction DNA Extraction from Federal Arrestees (<http://ssrn.com/abstract=2030417>), " 90 N.C. L. Rev. Addendum 157 (2012)

"Part I of the essay briefly reviews the federal statute that authorizes pre-conviction DNA extraction and the Fourth Amendment principles that underlie the current constitutional challenges to it. Part II identifies the various, and sometimes competing, rationales offered to justify the constitutionality of collecting DNA samples from individuals before they have been convicted of a crime. Part III then argues for a recalibration of the weight that courts currently place on the privacy interest in, and the government's need for, DNA samples from individuals who are presumed innocent."

Brave New World: The Use and Potential Misuse of DNA Technology in Immigration Law

(<http://lawdigitalcommons.bc.edu/cgi/viewcontent.cgi?article=1016&context=twlj&sei-redir=1&referer=http%3A%2F>

www.google.com/Furl/Fsa%3Dt%26rct%3Dj%26q%3DBrave%2BNew%2BWorld%253A%2BThe%2E%3A%20Use%20Potential%20Misuse%20DNA%20Technology%20Immigration%20Law%22), 30 B.C.

Third World L.J. 239, 248 (2010)

"DNA technology revolutionized criminal law, family law and trust and estates practice. It is now revolutionizing immigration law. Currently the Department of Homeland Security does not require DNA tests, but it recommends these tests when primary documentation, such as marriage licenses, birth certificates and adoption papers are not available to prove the relationship between the U.S. citizen petitioner and the beneficiary who is seeking permanent resident status in the United States. DNA tests are attractive to the government as a result of administrative convenience and as a means of countering fraud, but adoption of a wholesale policy of DNA testing poses a host of potential problems. In an area of law where family reunification is

described as the primary goal, an increase in the use of DNA sometimes results in separating families and other unintended consequences. By promoting the use of DNA evidence, the social interests that are paramount in a family relationship could become subservient to genetic interests. The beneficiaries could become mere genetic entities, whose biological relationship through their genes is paramount. This promotes the view that shared genes are the principal means of identifying human relationships and that one should be entitled to legal benefits solely on this basis. Quality control in the collection, storage and testing of samples, access of individuals to testing facilities, especially in developing countries, privacy interests and the potential for misuse of the results of these tests, particularly in preventing the admission of aliens on health grounds are among the potential problems identified in this article. Using examples from disciplines where DNA evidence has been adopted--criminal, family and estates and trusts law--this article will present a workable policy for the use of this technology in immigration law."

Chimeras: Double the DNA-Double the Fun for Crime Scene Investigators, Prosecutors, and Defense Attorneys? (<http://www.uakron.edu/dotAsset/727954.pdf>) , 40 Akron L. Rev. 435 (2007)

"This article first explores the mythological origins of the term "chimera." It then explores the causes and scientific explanations of chimerism and the various conditions covered by the term chimera in the area of genetics. Although this article will discuss the various Chimeric conditions that are thought to exist, its primary focus is on chimerism that is the result of the fusing of embryos in utero. Next, the article will discuss recent cases of chimerism – and of alleged chimerism – and how the genetic differences between chimeras and the general population came to light. It also will discuss the implications that chimerism may have on the investigation, prosecution, and defense of criminal cases by providing hypothetical criminal scenarios involving a Chimeric defendant. Finally, the article will address the possibility that chimerism may have a "Reverse CSI Effect" on criminal cases."

Chimeric Criminals (https://conservancy.umn.edu/bitstream/144217/4/Chimeric-Criminals-by-David-Kay_MN-Journal-Law-Science-Tech-Issue-14-1.pdf) , 14 Minn. J.L. Sci. & Tech. 1 (2013)

"Several commentators have speculated about the importance of an obscure genetic condition known as chimerism for DNA identification. The most extreme views appear in a recent book, **Genetic Justice: DNA Databanks, Criminal Investigations, and Civil Liberties** (<http://www.tufts.edu/~skrimsky/PDF/Genetic%20Justice.PDF>) . As part of "a stream of measured arguments" that supposedly supplies "a deeper and more balanced appreciation of the issues" and an "inspiring yet realistic vision," Sheldon Krinsky and Tania Simoncelli state that an obscure genetic condition known as chimerism "could undermine the very basis of the forensic DNA system" and force a reconsideration of "the entire project of forensic DNA." This claim is as baseless as it is breathless. Chimerism is a consideration in, but not a major obstacle to, DNA identification. This essay explains why."

Collateral Consequences, Genetic Surveillance and the New Biopolitics of Race

([https://www.law.upenn.edu/cf/faculty/roberts1/workingpapers/54HowLJ567\(2011\).pdf](https://www.law.upenn.edu/cf/faculty/roberts1/workingpapers/54HowLJ567(2011).pdf)) , 54 How. L.J. 567 (2011)

"Part I of this Article reviews the expansion of DNA data banking by states and the federal government, extending the collateral impact of a criminal record - in the form of becoming a permanent suspect - to growing categories of people. Part II argues that the benefits of this genetic surveillance in terms of crime detection, exonerations of innocent inmates, and public safety do not outweigh the unmerited collateral penalty of state invasion of individuals' privacy and the larger harms to democracy. These harms are exacerbated by the disproportionate collection of DNA from African Americans as a result of deep racial biases in law enforcement. Part III explains why DNA databases reflect and help to perpetuate a Jim Crow system of criminal justice. Finally, Part IV elaborates the racial harms that are caused by genetic

surveillance that targets large numbers of African Americans, putting into practice deep-seated stereotypes about blacks' inherent criminality. Far from correcting racial bias in law enforcement, the state's use of DNA to designate millions of permanent suspects reinforces the roots of racial injustice."

[Concerns Associated with Expanding DNA Databases](http://hstlj.org/articles/concerns-associated-with-expanding-dna-databases/) (<http://hstlj.org/articles/concerns-associated-with-expanding-dna-databases/>) , 2 Hastings Sci. & Tech. L. J. 267 (2011)

"The establishment of DNA databases has been and continues to be a source of controversy. Proponents of DNA databases argue that it supports a discipline that does not rely on subjective judgments and interpretations, and expanding DNA databases will not only help to solve more crimes but also exonerate innocent people who have been wrongly convicted, ultimately reducing the need to reverse previous miscarriages of justice. Opponents of DNA databases, on the other hand, argue that there is a risk of DNA being used to the exclusion of material that might prove the innocence of the suspect. Also, the fact that DNA samples can be stored indefinitely raises concerns regarding the temptation to use those samples for new and unidentified purposes. This piece discusses the use of DNA in modern forensics, details the three largest DNA databases in the world, explains the process of obtaining a "cold hit" and the problems surrounding related probabilities and statistics that can mislead juries and courts, analyzes the problems with existing DNA database statutes in the United States (U.S.), and considers the privacy issues surrounding DNA and DNA databases."

[Databases, E-Discovery and Criminal Law](http://ssrn.com/abstract=1789845) (<http://ssrn.com/abstract=1789845>) , 15 Rich. J.L. & Tech. 6 (2009)

"The discussion is divided into several areas, beginning with an examination of the benefits of database discovery in criminal practice under Part I. Part II is an analysis of the small body of criminal electronic discovery cases involving databases and the rules that have been applied over the years. Parts III and IV analyze the constitutional foundations for defense access to government database tools under due process, compulsory process and the right to confrontation. Applications of these theories are illustrated through developments in DNA database discovery in Part V, which highlights challenges to the quality of data and the right to access DNA databanks for defense investigation. The issues that arise in challenging evidence derived from databases, particularly data relied on by experts, are discussed in Part VI. The ongoing problem of achieving defense parity with prosecution resources and the constitutional grounds for overcoming objections to disclosure or access to database information is considered in Part VII. Finally, the conclusion, Part VIII, considers the enormity of the task facing advocates as the criminal justice system, and society at large, come to terms with this next wave in the Information Revolution."

[Defying DNA: Rethinking the Role of the Jury in an Age of Scientific Proof of Innocence](http://ssrn.com/abstract=2239283) (<http://ssrn.com/abstract=2239283>) , SSRN (2013)

"In 1946, public outrage erupted after a jury ordered Charlie Chaplin to support a child who, according to apparently definitive blood tests, was not his. Half a century later, juries have again defied apparently definitive evidence of innocence, finding criminal defendants guilty based on a confession or eyewitness notwithstanding exculpatory DNA test results. One might expect judges in such cases to direct an acquittal, on grounds that the evidence is legally insufficient because no rational juror could find guilt beyond a reasonable doubt. Yet few if any do. Instead, courts defer to juries when they form an actual belief in guilt based on testimonial evidence, however weak, and even when contradicted by highly compelling evidence of innocence. In this Article, I [Andrea L. Roth (<http://www.law.berkeley.edu/php-programs/faculty/facultyProfile.php?facID=15052>)] argue that guilty verdicts defying DNA uniquely upend three assumptions underlying this deference doctrine: first, that juries are particularly good at determining credibility, and that the

public believes this to be so; second, that reserving credibility as the province of the jury maintains systemic legitimacy by avoiding trial by machine; and third, that the reasonable doubt standard should focus on jurors' actual belief in guilt rather than solely on the quantum and quality of proof. After explaining why the deference doctrine is unjustified, I propose changes to sufficiency law that would foreclose convictions in the face of evidence difficult to reconcile with guilt, while also ensuring that judges do not place science on an epistemic pedestal or intrude upon the jury's role as voice and conscience of the community."

DNA Collection at Birth: A Uniform System of Identification (<https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=26+J.+Civ.+Rts.+%26+Econ.+Dev.+303&srctype=smi&srcid=3B15&key=a503c15f5752502324cd6d36cd3c2925>) , 26 J. Civ. Rts. & Econ. Dev. 303 (2012)

"The first part of this Note will discuss the history of mandatory DNA collection in the United States, focusing primarily on federal and New York State laws, from the founding of such databases to the current laws governing compulsory collection. Part II of this Note will examine the various shortcomings of the current laws, advocating that the proposed New York legislation does not go far enough in resolving some of the major setbacks. Part III of this Note will provide a detailed guide to the mechanics of the proposed DNA database, including how and when DNA should be collected, where it will be stored, what it will be used for, who will have access to it, and when it will be accessible. The fourth and final part of this Note will address anticipated criticisms and explain how this proposed system would be able to pass constitutional muster."

DNA Copyright (<http://scholar.valpo.edu/cgi/viewcontent.cgi?article=2221&context=vulr&sei-redir=1&referer=http%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3Ddna%2520copyright%252C%252046%2520va%2C%2046%20val.%20u.%20l.%20rev.%201%22>) , 46 Val. U. L. Rev. 1 (2011)

"This Article suggests that DNA—especially synthetic DNA—constitutes eligible subject matter for copyright protection under the Copyright Act. Although DNA has long been copyrightable, in theory, the movement towards synthetic DNA in biotechnology has further strengthened existing arguments in favor of DNA copyright. Section II of this Article illustrates some of the features of DNA that suit it for copyright protection by tracing the conceptual evolution of DNA from factor to program. Section III suggests the usefulness of DNA copyright through a discussion of the recent rocky road down which gene patents have been traveling. Section IV sketches the rise of synthetic biology as a distinct field. Section V outlines why DNA is eligible for copyright protection, considers implications of DNA copyright, and then discusses benefits that might accrue to society under a DNA copyright regime, including those flowing from fair use provisions and the fostering of open source biology. The Article concludes by suggesting that DNA copyright: (1) already exists; (2) provides an alternative to DNA patenting; and (3) may provide a number of societal benefits in terms of biological innovation and improved societal access to the fruits of such innovation."

DNA Fabrication, A Wake Up Call: The Need to Reevaluate the Admissibility and Reliability of DNA Evidence (<http://scholarworks.gsu.edu/cgi/viewcontent.cgi?article=1018&context=gsulr&sei-redir=1&referer=http%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3Dfrumkin%2520dna%2520fabricated%26source>) , 27 Ga. St. U. L. Rev. 409 (2010-2011)

"In June 2009, Israeli forensic science researchers published a ground breaking study that put credence to the possibility of creating artificial Deoxyribonucleic Acid (DNA) that can fool current forensic testing procedures. The researchers asserted that anyone with the proper equipment and basic understanding of molecular biology could create artificial DNA in virtually unending amounts. Furthermore, the research demonstrates that the current American forensic science

system utilized by law enforcement is incapable of distinguishing between artificial and genuine DNA. . . .

DNA fabrication calls into question the reliability of DNA evidence used in the current forensic science and law enforcement systems. Part I of this note provides background on DNA, the findings of the Israeli report, the ease of fabricating and planting DNA, and DNA admissibility standards currently at use in United States courtrooms. Part II discusses DNA's current admissibility as compared to newer forms of forensic evidence and the possible impact artificial DNA could have on the admissibility of DNA evidence. Ultimately, Part III proposes that all courts adopt the Frye-Kelly standard of admissibility for DNA evidence as well as additional requirements in light of this new discovery."

[DNA, Genetic Material, and a Look at Property Rights: Why You May Be Your Brother's Keeper](https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=19+Tex.+Wesleyan+L.+Rev.+967&srctype=smi&srcid=3B15&key=cb409709c3d68c6883cf7bd00cc74d98) (<https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=19+Tex.+Wesleyan+L.+Rev.+967&srctype=smi&srcid=3B15&key=cb409709c3d68c6883cf7bd00cc74d98>) , 19 Tex. Wesleyan L. Rev. 967 (2013)

"Federal legislation such as the Health Insurance Portability and Accountability Act of 1996 ("HIPAA") and the Genetic Information Nondiscrimination Act of 2008 ("GINA") addressed concerns of genetic privacy and genetic discrimination in healthcare and employment. But, the perceived shortcomings and limited applicability of federal legislation spawned state legislation seeking to strengthen genetic privacy. On January 21, 2011, the Massachusetts legislature introduced a Genetic Bill of Rights that seeks to ensure genetic privacy and establish genetic property rights that align with Massachusetts's current property law. This Comment evaluates concerns regarding familial DNA testing, surreptitious genetic testing, and genetic privacy. Accordingly, this Comment looks at how various courts addressed these issues, legislative remedies at the state and federal level, and potential dangers of over-legislating. Finally, this Comment recommends a legislative solution."

[Expanding Use of DNA in Law Enforcement: What Role for Privacy?](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1512746) (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1512746) , 34 J.L. Med. & Ethics 153 (2006)

"DNA identification methods are such an established part of our law enforcement and criminal justice systems it is hard to believe that the technologies were developed as recently as the mid-1980s, and that the databases of law enforcement profiles were established in the 1990s. Although the first databases were limited to the DNA profiles of convicted rapists and murderers, the success of these databases in solving violent crimes provided the impetus for Congress and state legislatures to expand the scope of the databases with little critical examination of each expansion's value to law enforcement or cost to privacy and civil liberties."

[Faulty Foundations: How the False Analogy to Routine Fingerprinting Undermines the Argument for Arrestee DNA Sampling](http://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1570&context=wmborj) (<http://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1570&context=wmborj>) , 19 Wm. & Mary Bill Rts. J. 475 (2010)

"This Note will argue, in part, that the rulings of courts upholding arrestee DNA sampling statutes represent a surrender to cultural intuitions regarding DNA evidence. The promise of a massive DNA database, a revolutionary law enforcement tool, is a powerful one, and the first courts to uphold arrestee DNA sampling have allowed this promise to cloud their legal judgment. These courts have shrouded the argument for constitutionality in the precedential value of routine fingerprinting, but, as this Note will make clear, that analogy rings false."

[Genetics, Race and Substantive Due Process](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2169450) (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2169450) , SSRN (2012)

"The reemergence of a biological understanding of race is not surprising, both given the

recentness of our history of manipulating science to validate racial difference and the increasing cognitive and moral need to rationalize continuing racial inequalities as normal and natural in a "post-race" era. This Article links the modern trend to view race in genetic terms to the post-race worldview, while framing the doctrinal and constitutional argument against the legal acceptance of genetic racial theories. The first section of the Article will chart the historical invention of the race concept, while highlighting the critical role that science has played in shaping our understanding of race and difference. The section will also examine the Postwar rejection of biological theories of race, while further elaborating on the socio-political nature of race.

Part II of the Article explores the conflicting ways in which our Postwar society has interpreted racial inequality. A model of race consciousness dominated the manner in which our society viewed existing racial disparities during the Civil Rights era, yet was soon displaced by colorblind and post-racial interpretative methodologies. This section examines this history, while relying on psychological theory to suggest that such post-race distancing moves are motivated by an implicit desire to move beyond race and conceal systemic racism.

Part III of the Article analyzes the modern trend to view race in genetic terms, and explores the manner in which the field of population genetics has been relied on to normalize scientific racial distinctions. This section also analyzes the judicial acceptance of racial probabilistic interpretations of DNA evidence, and sets forth a doctrinal critique of the practice under the Federal Rules of Evidence. In particular, this section argues for an amendment to the Federal Rules of Evidence that would clearly establish the inadmissibility of such evidence at trial.

The final section of the Article sets forth a substantive Due Process challenge to the legal acceptance of genetic theories of race. This section argues that the substantive Due Process doctrine underlying the 5th and 14th Amendments, as informed by the 9th Amendment, is violated whenever the State officially embraces genetic views on race. In particular, this section argues that such a practice violates the fundamental constitutional right to a common humanity by placing State imprimatur on discredited notions of racial biological difference."

[Identifying Participants in the Personal Genome Project \(http://ssrn.com/abstract=2257732\)](http://ssrn.com/abstract=2257732) , SSRN (2013)

"We linked names and contact information to publicly available profiles in the Personal Genome Project. These profiles contain medical and genomic information, including details about medications, procedures and diseases, and demographic information, such as date of birth, gender, and postal code. By linking demographics to public records such as voter lists, and mining for names hidden in attached documents, we correctly identified 84 to 97 percent of the profiles for which we provided names. Our ability to learn their names is based on their demographics, not their DNA, thereby revisiting an old vulnerability that could be easily thwarted with minimal loss of research value. So, we propose technical remedies for people to learn about their demographics to make better decisions."

[Legal and Ethical Issues in Forensic DNA Phenotyping \(http://ssrn.com/abstract=2288204\)](http://ssrn.com/abstract=2288204) , SSRN (2013)

"In the recent Supreme Court case of *Maryland v. King*, which addresses the constitutionality of compulsory collection of DNA samples from felony arrestees, the state and federal government repeatedly underscored that forensic tests of biological samples look only at meaningless, non-sensitive information. These non-coding, non-expressive parts of the genome have even earned a nickname, "junk," that alone does much to assure the public that the police are not scrutinizing confidential information. The distinction is important in the legal community as well: Judges have consistently privileged the benefits to crime-solving against the minimal privacy

intrusion posed by revelation of this otherwise meaningless string of numbers.

But of course, efforts at unlocking the deeper secrets of the human genome continue apace. In 2012, researchers debuted the first commercially available tool that can simultaneously analyze genetic information from an array of sites on the genome and produce information related to biogeographic ancestry, eye and hair color, relatedness, and sex. Developments that predict age, facial morphology, height and other physical traits may loom on the horizon, and primitive research has even drawn connections between the MAOA gene and propensity to violence.

This paper examines the legal and ethical implications of forensic DNA genotyping, or "FDP." It canvasses existing rules and regulations that might hasten or thwart such testing, and considers its potential utility for criminal cases. It further considers the moral and ethical questions implicated by testing for more than just "junk" DNA."

[Maryland v. King: Policing and Genetic Privacy \(http://ssrn.com/abstract=2312743\)](http://ssrn.com/abstract=2312743) , SSRN (2013)
"With its decision in *Maryland v. King*, the Supreme Court finally stepped into the debate about the use of DNA databases in the American criminal justice system. With *King*, the Court decided a newly emerging database issue rather than an old one: whether the Fourth Amendment prohibits the collection of DNA samples from arrestees without a warrant or any individualized suspicion. According to the five member *King* majority, such compulsory collections are reasonable Fourth Amendment searches, given the outcome of a balancing of interests between the individual and government. The problem with *King* is that it may become influential in ways that weren't fully contemplated by the Supreme Court. While some may lament the micromanagement of policing by the modern Supreme Court's jurisprudence, the reality is that police investigation practices are unevenly regulated. Indeed, what *King* reveals is the extent to which the Court leaves many matters untouched by Fourth Amendment constraints and subjects them, for better or worse, to the control of the other political branches (as well to likely squabbling in the lower courts). This essay discusses three notable revelations in the Court's decision about the future of policing and genetic privacy. As the essay argues, what the Court introduces it also fails to regulate or even guide in any significant sense."

[Naturally Shed DNA: The Fourth Amendment Implications in the Trail of Intimate Information We All Cannot Help But Leave Behind \(http://law.ubalt.edu/academics/publications/lawreview/volumes/7_Silvestri.41.1.pdf\)](http://law.ubalt.edu/academics/publications/lawreview/volumes/7_Silvestri.41.1.pdf) , 41 U. Balt. L. Rev. 165 (2011)

"This comment aims to present and analyze the Fourth Amendment issues involved when the government seizes and analyzes naturally shed DNA, and in particular, whether advancements in technology call for a new approach to the abandonment doctrine. Part II explains the evolution of Fourth Amendment jurisprudence and how courts thus far have approached DNA analysis in the Fourth Amendment context. Part III explains why naturally shed DNA represents a unique challenge for courts and is different from fingerprints and the DNA evidence considered in past cases. Part IV proposes a solution - a statute declaring a per se reasonable expectation of privacy in naturally shed DNA."

[New Forensics Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence \(http://ssrn.com/abstract=896128\)](http://ssrn.com/abstract=896128) , 95 Cal L Rev 721 (2007)

"This Article challenges the new orthodoxy of forensic science. In so doing, it reframes the debate about forensic evidence in the criminal justice system in three respects. First, this Article sets forth a new taxonomy of forensic evidence, and distinguishes between first and second generation sciences by enumerating specific, classifiable characteristics. Second, using that framework, this Article illustrates how the pathologies of the criminal justice system that ultimately tarnished the first generation of forensic evidence are in fact aggravated, rather than

relieved, by the particular characteristics of the second generation. Lastly, this Article criticizes current approaches to improving the use of forensic evidence in the criminal justice system for failing to account for the particular characteristics of second generation sciences, and instead advocates for changes tailored to those specific concerns."

[No Cilia Left Behind: Analyzing the Privacy Rights in Routinely Shed DNA Found at Crime Scenes](http://lawdigitalcommons.bc.edu/bclr/vol54/iss2/9/) (<http://lawdigitalcommons.bc.edu/bclr/vol54/iss2/9/>) , 54 B.C. L. Rev 789 (2013)

"As science advances, researchers are learning more about the meaning of information that is contained in the human genome. Because we routinely shed DNA in public, this has significant implications for an individual's ability to keep genetic information private. If routinely shed DNA is found at a crime scene, there is a significant governmental interest to sequence the DNA in order to uncover suspects or potential witnesses. This Note analyzes the implications of advancing technology on an individual's right to privacy in one's own genetic information, and it argues that informational privacy should be protected for non-phenotypic information in routinely shed DNA at crime scenes."

[Nuclear and Mitochondrial DNA in the Courtroom](http://heinonline.org/HOL/LandingPage?collection=journals&handle=hein.journals/jlawp13&div=10&id=&page=) (<http://heinonline.org/HOL/LandingPage?collection=journals&handle=hein.journals/jlawp13&div=10&id=&page=>) , 13 J. L. & Pol'y 69 (2005)

"In the early 1990s vigorous challenges to the admissibility of DNA evidence were mounted in both the legal and scientific arenas. More recently, however, DNA evidence has become widely accepted, and challenges based on *Daubert v. Merrell Dow Pharmaceuticals* or *Frye v. United States* are now few and far between. Nevertheless, interpreting DNA evidence often is not simple and requires a sound understanding of the theory involved and the underlying assumptions. The current use of two different categories of DNA evidence - mitochondrial DNA and nuclear DNA - adds an additional layer of complexity."

[On the "Considered Analysis" of Collecting DNA Before Conviction](http://www.uclalawreview.org/?p=4172) (<http://www.uclalawreview.org/?p=4172>) , 60 UCLA L. Rev. Disc. 104 (2013)

"Even before the Court met to consider granting a writ of certiorari [in *Maryland v. King*], Chief Justice Roberts stayed the Maryland judgment. His in-chambers opinion stated that, "given the considered analysis of courts on the other side of the split, there is a fair prospect that this Court will reverse the decision below." In chronological order, the opinions that received the Chief Justice's approbation come from Virginia (*Anderson v. Commonwealth*), the Third Circuit (*United States v. Mitchell*), and the Ninth Circuit (*Haskell v. Harris*). The Chief Justice cited the fourth opinion—from the Arizona Supreme Court (*Mario W. v. Kaipio*)—separately, as it straddles the divide with a no-peeking rule that permits collection but not testing of DNA before conviction. I shall call these four cases the "stay-opinion cases."

This Essay briefly examines these opinions. My objective is limited. I [[David H. Kaye](http://law.psu.edu/faculty/resident_faculty/kaye) (http://law.psu.edu/faculty/resident_faculty/kaye)] do not consider whether these cases were decided correctly or incorrectly. Rather, I ask whether the opinions supply a fully "considered analysis" of the Fourth Amendment as it applies to arrestee DNA databases. I argue that the Supreme Court will need to engage in a deeper and more precise analysis, and I indicate how that analysis might proceed."

[Policing Identity](http://ssrn.com/abstract=2039091) (<http://ssrn.com/abstract=2039091>) , 92 B.U. L. Rev. 1561 (2012)

"Identity has long played a critical role in policing: learning "who" an individual is not only affords police knowledge of possible criminal history but also "what" an individual might have done. To date, however, these matters have eluded sustained scholarly attention, a deficit assuming ever greater importance as government databases have become more comprehensive and powerful

over time. This Article seeks to remedy the identity crisis that has affected identity evidence. It does so by first surveying the methods historically used by police to identify individuals, ranging from nineteenth century efforts to measure bodies and note physical marks to today's biometric identifiers. As this history makes clear, the American justice system has not kept pace with this evolution, failing to impose meaningful constraints on police authority to collect and use identity evidence. The Article highlights this shortcoming and offers a remedy, focusing on two central yet unresolved questions: (i) whether and how limits should be placed on the collection and use of legally obtained identity evidence, DNA in particular, and (ii) whether illegally obtained identity evidence should be subject to suppression. In doing so, the Article provides a much-needed analytic framework for courts as they seek to balance social control needs and individual civil liberties."

[Race, Genes, and Justice: A Call to Reform the Presentation of Forensic DNA Evidence in Criminal Trials](http://ssrn.com/abstract=1371700) (<http://ssrn.com/abstract=1371700>) , 74 Brook. L. Rev. 325 (2009)

"The article considers how and when, if at all, is it appropriate to use race in presenting forensic DNA evidence in a court of law? This relatively straightforward question has been wholly overlooked by legal scholars. By pursuing it, this article promises to transform fundamentally the presentation forensic DNA evidence. Currently, it is standard practice for prosecutors to use race in presenting the odds that a given defendant's DNA matches DNA found at a crime scene. This article takes an interdisciplinary approach to question the validity of this widespread but largely uninterrogated practice. It examines how race came to enter the construction and presentation of forensic DNA evidence in the early 1990s and considers how its use has persisted and developed over time. It asks the basic question of what race adds as a practical matter to ability of the finder of fact to make fair and accurate decisions and weighs this against the potential dangers of bias created by introducing issues of race as genetic into the context of what is usually a violent crime. It considers how current technological advances have largely rendered the use of race irrelevant to the calculation of odds ratios necessary to establish a match between a DNA sample left at a crime scene and DNA from a suspect. It argues that in most cases such evidence should be excluded as irrelevant, or if deemed relevant it should be held inadmissible because the dangers of infecting the proceedings with racial prejudice outweigh any possible benefit that introducing the race-based statistics could provide. This is particularly the case where race is being introduced in a context that involves constructing a relationship between genetics and violent crime.

The article concludes with a brief synthesis of the arguments for ending the practice of using race frame the presentation of forensic DNA evidence. It notes this would not materially hinder the ability of prosecutors to obtain convictions using DNA evidence, nor of defendants to challenge such evidence. Yet, by removing the gratuitous introduction of race into a context of genetics and violent crime, such reform would promote a positive and significant reorientation of the relation among race, genes, and justice."

[Reclaiming "Abandoned" DNA: The Fourth Amendment and Genetic Privacy](http://ssrn.com/abstract=702571) (<http://ssrn.com/abstract=702571>) , 100 Nw. U. L. Rev. 857 (2006)

"We leave traces - skin, saliva, hair, and blood - of our genetic identity nearly everywhere we go. Should the police be permitted, without restriction, to target us and to collect the DNA that we leave behind? In a growing number of instances, the police, unburdened by criminal procedure rules, seek this abandoned DNA from criminal suspects in hopes of resolving otherwise unsolvable cases. Abandoned DNA is any amount of human tissue capable of DNA analysis and separated from an individual's person inadvertently or involuntarily, but not by police coercion. What are the consequences of allowing this investigative method to remain unregulated? In stark distinction to the growing body of commentary on the collection of DNA samples for state and

federal DNA databases, little attention has been paid to this backdoor method of DNA collection.

Deciding whether DNA might ever be abandoned is important, because abandoned DNA provides the means to collect genetic information from anyone, at any time. Criminal procedure law poses no restrictions on this kind of evidence collection by the police. Not only does the label of abandonment affect police behavior, it also raises basic questions about the changing nature of legal identity. How should we characterize the relationships between our physical bodies and our identities, now that nearly any body particle can reveal our genetic information? The final part of this Essay proposes first steps towards addressing the problem, but its primary task is to show the need to reframe the debate over covert involuntary DNA sampling and to make the case for genetic exceptionalism."

[Redeeming the Genetic Groupon: Efficacy, Ethics, and Exploitation in Marketing DNA to the Masses](http://ssrn.com/abstract=2020634) (<http://ssrn.com/abstract=2020634>) , 81 Miss. L.J. 363 (2012)

"From mild curiosities to very sober considerations, more Americans have taken steps to crack open their genetic codes and obtain information on everything from global origins to drug interactions to inherited illness mutations. The idiosyncrasies and unique characteristics revealed by these tests lend more validation to the notion that we are more than just another brick in the wall.

The availability of direct-to-consumer genetic testing has skyrocketed in comparison to its non-existence only a decade ago. No longer in its infancy stages, these commercially available genetic tests offer a wide range of services to consumers beyond diseases prediction, including intelligence measurements, compatible mate matching, and "DNA Tribe" identification, a growing number of individuals send the DNA samples to these companies with little understanding of the scope of their consent or whether they maintain any rights or interest in their DNA. Moreover, the accuracy and reliability of such services largely remains untested.

My [[Jessica D. Gabel](http://law.gsu.edu/directory/gabel) (<http://law.gsu.edu/directory/gabel>)] article argues that genetic profiteering runs the risk of generating genetic misinformation. As the industry currently stands, Genetic Groupings overpromise and underdeliver. In this article, I discuss the ethical implications of marketing DNA to the masses and the need for balanced regulatory oversight. First, I follow the evolution of genetic services, from the educational and medical mainstays to the current regulatory scheme that applies to them. Second, the article considers the predictive and predatory capabilities of "DIY DNA," where customers collect and mail in their own DNA swabs for various services. In the final section, I discuss the regulatory scheme that must be considered with Genetic Groupings. Although currently untouched by the FDA and ignored by the FTC, there is room for regulation that encourages innovation, protects privacy, delivers scientifically defensible results, and, of course, allows for profit."

[Rounding Up the Usual Suspects: A Logical and Legal Analysis of DNA Trawling Cases](http://ssrn.com/abstract=1134205) (<http://ssrn.com/abstract=1134205>) , 87 N.C. L. Rev. 425 (2009)

"Courts are beginning to confront a problem that has divided the scientific community - whether identifying a defendant by fishing through a database of DNA types to find a match to a crime-scene sample reduces the significance of a match. For years, the problem seemed academic. Now that the U.S. has more than five million DNA profiles from convicted offenders and suspects in a national, computer-searchable database, the question has assumed more urgency. Increasingly, individuals are being charged with crimes as a result of a match between their recorded profile and the DNA from a victim or scene of a crime. Arguing that there is no generally accepted scientific opinion on how the probative value of a match from a database trawl should be quantified, some of these defendants have moved to exclude the DNA evidence.

Trial courts have ruled both ways. Appellate courts in California and the District of Columbia have rebuffed these challenges, reasoning that the general-acceptance standard for scientific evidence does not apply in this situation. Furthermore, they have held that even though the defendant was not selected randomly, the jury can be given the usual probability that a randomly selected individual will match a crime-scene sample. This Article criticizes the reasoning (but not the outcome) in these opinions. It argues that the attempts to avoid directly confronting the debate among scientists and statisticians rob the opinions of any persuasive value. Elaborating on earlier statistical analyses of the database-trawl question, it presents a more satisfactory rationale for admitting the unadjusted random-match probability."

[Safety in Numbers - Deciding When DNA Alone Is Enough to Convict \(http://ssrn.com/abstract=1471684\)](http://ssrn.com/abstract=1471684) , 85 N.Y.U. L.Q. Rev. 1130 (2010)

"Fueled by police reliance on offender databases and advances in crime scene recovery, a new type of prosecution has emerged in which the government's case turns on a match statistic explaining the significance of a "cold hit" between the defendant's DNA profile and the crime-scene evidence. Such cases are unique in that the strength of the match depends on evidence that is almost entirely quantifiable. Despite the growing number of these cases, the critical jurisprudential questions they raise about the proper role of probabilistic evidence, and courts' routine misapprehension of match statistics, no framework currently exists - including a workable standard of proof - for determining sufficiency of the evidence in such a case. This article is the first to interrogate the relationship between "reasonable doubt" and statistical certainty in the context of cold hit DNA matches. Examining the concepts of "actual belief" and "moral certainty" underlying the "reasonable doubt" test, I [[Andrea L. Roth \(http://www.law.berkeley.edu/php-programs/faculty/facultyProfile.php?facID=15052\)](http://www.law.berkeley.edu/php-programs/faculty/facultyProfile.php?facID=15052)] argue that astronomically high source probabilities, while fallible, are capable of meeting the standard for conviction. Nevertheless, the starkly numerical nature of "pure cold hit" evidence raises unique issues that require courts to apply a quantified threshold for sufficiency purposes. I suggest as a starting point - citing recent juror studies and the need for uniformity and systemic legitimacy - that the threshold should be no less favorable to the defendant than a 99.9% source probability."

[Scarlet Gene: Behavioral Genetics, Criminal Law, and Racial and Ethnic Stigma \(http://ssrn.com/abstract=955254\)](http://ssrn.com/abstract=955254) , 69 Law and Contemp. Probs. 343 (Winter/Spring 2006)

"Your son is charged with murder, and his lawyer wants to use his genetic predisposition toward alcoholism as a defense. Some members of your family and community are concerned that this approach will only further stigmatize Tracy Islanders as alcoholics. How do you advise your son and his lawyer?"

These scenarios were presented to a panel of scientists, legal experts, journalists, and community leaders in a recent PBS television program entitled [Genes on Trial: Genetics, Behavior, and the Law \(http://www.pbs.org/inthebalance/archives/ourgenes/genes_on_trial/genes_video.html\)](http://www.pbs.org/inthebalance/archives/ourgenes/genes_on_trial/genes_video.html) . This article uses the television program as a framework for exploring the implications of behavioral genetics research for the individual, family, community, and society. In particular, it focuses on the unique potential for behavioral genetics research, when placed in the context of criminal law, to stigmatize racial and ethnic minority groups through the blame-shifting mechanisms of genetic reductionism and genetic determinism. Like the scarlet A in Nathaniel Hawthorne's famous novel, DNA associated with criminal or antisocial behavior might become a scarlet gene that marks the individual, his family, and his racial or ethnic community as flawed, compromised, and somehow less than fully human.

This article proceeds in six parts. The remainder of Part I summarizes the Genes on Trial program and introduces the issues raised by it. Part II explains why behavioral genetics research

tends to focus on discrete and insular populations that overlap with socially constructed racial or ethnic groups. Part III locates behavioral genetics research on a spectrum spanning from single-gene disorders to complex behavioral traits, positing that the behavioral end of the spectrum carries the most potential for stigma. Part IV explores how the blame-shifting mechanisms of genetic reductionism and genetic determinism affect the individual, family, community, and society when genetics research focuses on criminal or antisocial behavior. Part V analyzes how racial and ethnic stigma arise from behavioral genetics research and perpetuate inequality. Part VI concludes by considering the ethical dilemmas that geneticists face when choosing who and what to study."

[Waiting for John Doe: The Practical and Constitutional Implications of DNA Indictments](https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=18+Suffolk+J.+Trial+%26+App.+Adv.+108&srctype=smi&srcid=3B15&key=6035c4d5832481a24e15c14896b8eefb)

([https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=18+Suffolk+J.+Trial+%26+App.+Adv.+108&srctype=smi&srcid=3B15&](https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=18+Suffolk+J.+Trial+%26+App.+Adv.+108&srctype=smi&srcid=3B15&key=6035c4d5832481a24e15c14896b8eefb)

[key=6035c4d5832481a24e15c14896b8eefb](https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=18+Suffolk+J.+Trial+%26+App.+Adv.+108&srctype=smi&srcid=3B15&key=6035c4d5832481a24e15c14896b8eefb)), 18 Suffolk J. Trial & App. Adv. 108 (2013)

"This Note examines the problems that DNA indictments raise for criminal defendants as well as the potential safeguards against prosecutorial abuse in issuing nameless indictments. Part II discusses the factual and legal background of DNA evidence, including its historical development, technical underpinnings, and weaknesses. Part III traces the history and purpose behind statutes of limitations, the Fourth Amendment's particularity requirement, and the Sixth Amendment's "Speedy Trial" clause. Part IV details the history of John Doe indictments prior to the use of DNA technology through the present. Part V concludes by examining the current problems with issuing John Doe indictments, suggesting measures to ensure that defendants are not burdened by the use of these indictments, and anticipating future developments of the law."

[What Real-World Criminal Cases Tell Us About Genetics Evidence](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2308890) ([http://papers.ssrn.com](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2308890)

[/sol3/papers.cfm?abstract_id=2308890](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2308890)), 64 Hastings L.J. 1591 (2013)

"This Article, which is part of a symposium on "Law and Ethics at the Frontier of Genetic Technology," examines an unprecedented experimental study published in Science. The Science study indicated that psychopathic criminal offenders were more likely to receive lighter sentences if a judge was aware of genetic and neurobiological explanations for the offender's psychopathy. This Article contends that the study's conclusions derive from substantial flaws in the study's design and methodology. The hypothetical case upon which the study is based captures just one narrow and unrepresentative component of how genetic and neurobiological information operates, and the study suffers from serious omissions that affect the validity and reliability of its results. It is important to call attention to these problems given that the study's widely-publicized findings are likely to bolster inaccurate perceptions regarding the dangers of allowing behavioral genetics evidence in criminal cases. This Article concludes with a detailed discussion of a number of recent criminal cases involving behavioral genetics evidence. Familiarity with such cases may improve the real-world applicability of future experimental studies exploring the influence of genetics evidence on criminal cases."

PROFESSIONAL JOURNALS

[Can Jury Trial Innovations Improve Juror Understanding of DNA Evidence?](http://www.nij.gov/journals/255/trial_innovations.html) ([http://www.nij.gov](http://www.nij.gov/journals/255/trial_innovations.html)

[/journals/255/trial_innovations.html](http://www.nij.gov/journals/255/trial_innovations.html)), NIJ Journal, Nov. 2006

"[W]ill jurors be able to understand the expert's intricate analysis and use it to reach a verdict? And what—if any—steps can be taken to increase jurors' comprehension of complex DNA evidence? Questions such as these prompted an NIJ-funded study on the impact of jury trial innovations upon mock jurors' understanding of contested mitochondrial DNA (mtDNA) evidence. (See "How Mitochondrial DNA Compares to Nuclear DNA (http://www.nij.gov/journals/255/trial_innovations.html#compare) .") By examining how jurors in different experimental conditions

performed on a Juror Comprehension Scale both before and after deliberations, researchers were able to assess whether four specific innovations improved jurors' understanding of this complex evidence and identify which innovations worked best."

[Cognitive Bias and the Evaluation of Forensic Evidence \(http://www.nacdl.org/Champion.aspx?id=24511\)](http://www.nacdl.org/Champion.aspx?id=24511) , Champion, May 2012, at 12

"Generally speaking, cognitive bias refers to distortions in perception and judgment that occur in certain situations. For example, the perception of a stimulus may be influenced by its surroundings. In Figure 1 (p.18), although the orange circles are the same size, one appears larger than the other due to the size of the circles around them. Similarly, the shades of gray in Figure 2 (p.18) are identical, but appear darker or lighter depending on the background. In order to deal with complex or ambiguous information efficiently, we also routinely use a number of mental "shortcuts." For instance, we are likely to overestimate the frequency of plane crashes when we have just heard about one on the news, because that information easily comes to mind. Also, consider the characteristics we attribute to people based solely on their manner of dress, or upon discovering they work as an accountant, a fashion model, a police officer, or a tattoo artist. These assumptions are derived from our stereotypes about (and experiences with) people in such categories. Since we cannot possibly process and remember every piece of data we encounter, simplified information processing strategies serve an adaptive purpose. On occasion, however, such cognitive processes can lead to distorted or inaccurate judgments."

[Database Access and the Defense \(http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202463668124&Database_Access_and_the_Defense\)](http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202463668124&Database_Access_and_the_Defense) , NYLJ, July 20, 2010, at 5
"Today, the principal witness against the accused is often a computer database. While the right of confrontation was intended to address human witnesses, defendants are facing evidence drawn from computer-generated sources. And when identifications are constructed from computer profiles, the right of the accused to access a database in order to challenge the reliability of a match or unearth the existence of alternate suspects is critical."

[DNA Identification Evidence in Criminal Prosecutions \(http://www.llrx.com/features/dnareliability.htm\)](http://www.llrx.com/features/dnareliability.htm) , LLRX, Mar. 7, 2010

"In criminal cases, there have been challenges on sufficiency grounds and concerns over the use of forensic DNA evidence as the sole or primary proof of guilt. Uncorroborated DNA matching might not be enough to satisfy the burden of establishing guilt beyond a reasonable doubt. The reliability of forensic DNA testing results might be questioned for any number of reasons, e.g., laboratory error, cross-contamination, interpretive bias or fraud, etc. See generally [Tarnish On the 'Gold Standard': Recent Problems in Forensic DNA Testing \(http://www.nasams.org/forensics/for_lib/Documents/1138913547.79/DNA%20Problems1.pdf\)](http://www.nasams.org/forensics/for_lib/Documents/1138913547.79/DNA%20Problems1.pdf) , Champion, Jan./Feb. 2006, at 10. Studies, standards and case reviews have highlighted the types of miscalculations that can occur and undermine confidence in evidence derived from genetic matching. Every kind of problem from mathematical errors to laboratory mishaps to fakery can plague the presumptive efficacy of DNA testing. See, e.g., [Already Under Fire, Crime Labs Cut to the Bone \(http://www.msnbc.msn.com/id/35319938/ns/us_news-crime_and_courts/page/2/\)](http://www.msnbc.msn.com/id/35319938/ns/us_news-crime_and_courts/page/2/) , MSNBC, Feb. 23, 2010. This article highlights recent publications that underscore the need for closer scrutiny and weighing of DNA profiling when it is offered as the principal or exclusive evidence of guilt beyond a reasonable doubt."

[DNA, Privacy and Personhood: The Crime of Being Alive \(http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202611883192&DNA_Privacy_and_Personhood_The_Crime_of_Being_Alive\)](http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202611883192&DNA_Privacy_and_Personhood_The_Crime_of_Being_Alive) , N.Y.L.J., July 23, 2013, at 5

"The Bill of Rights is instinct with privacy, the Civil War Amendments with personhood. But the

layers of our lives—the "persons, houses, papers, and effects"—are being peeled away by technology. The U.S. Supreme Court's affirmation of DNA "test upon arrest" is among the latest developments in a mindset that can make being alive a crime. A buccal swab is not as physically invasive as a blood test, but it is infinitely more telling than a fingerprint. The DNA collected from the inside of someone's mouth contains unprecedented quantities and dimensions of information. Once entered into a crime scene databank, it transforms identification pretext into investigation context."

[DNA Sampling: A Challenge to Privacy and Dignity \(http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202555395147&DNA_Sampling_A_Challenge_to_Privacy_and_Dignity\)](http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202555395147&DNA_Sampling_A_Challenge_to_Privacy_and_Dignity) , N.Y.L.J., May 22, 2012, at 5

"Before suspects are indicted or even arrested, they can find themselves at the beginning of the DNA pipeline, otherwise known as DNA sampling. The U.S. Supreme Court recently declined to hear a case directly addressing the constitutionality of test-on-arrest laws, leaving federal and state courts to reach their own conclusions about the lawfulness of this practice. Thirty years ago, New York's highest court set limits on how far police and prosecutors could go to obtain someone's biological information, which laid the groundwork for DNA sampling challenges today."

[DNA Solves Property Crimes \(But Are We Ready for That?\) \(http://www.nij.gov/journals/261/dna-solves-property-crimes.htm\)](http://www.nij.gov/journals/261/dna-solves-property-crimes.htm) , NIJ Journal No. 261, Oct. 2008

"Results of an experiment using DNA to solve property crimes are in: collecting biological evidence at burglary scenes works. The study — funded by the National Institute of Justice (NIJ) and evaluated by the Urban Institute — compared burglary investigations that used only traditional police practices to burglary investigations in which DNA evidence was also collected and analyzed. The study revealed that, when DNA was added to traditional property crime investigations: * More than twice as many suspects were identified. * Twice as many suspects were arrested. * More than twice as many cases were accepted for prosecution. . . . Policy decisions. Big policy decisions.

As we increasingly come to understand the potential of DNA to solve property crimes, the demands to use this highly effective tool could overwhelm our criminal justice system. Although the DNA Field Experiment showed that benefits are clear and dramatic, some of the big-picture policy questions are confounding: * How will our nation's crime laboratories process the increase in evidence? * Are we willing to hire more prosecutors and public defenders to handle an increased volume of cases? * How can we ensure that using DNA to solve burglaries will not pull investigative resources away from other criminal investigations, such as sex crimes in which consent is the issue, robbery and domestic violence? * If we solve the police and crime lab issues, do we need to revisit sentencing guidelines — or are we ready to build more jails and prisons to handle an influx of property crime offenders?"

[Evaluating Forensic DNA Evidence Essential Elements of a Competent Defense Review Pt I \(http://www.bioforensics.com/articles/champion1/champion1.html\)](http://www.bioforensics.com/articles/champion1/champion1.html) , Champion, April 2003, at 16 and [Evaluating Forensic DNA Evidence Essential Elements of a Competent Defense Review Pt II \(http://www.bioforensics.com/articles/Champion2.pdf\)](http://www.bioforensics.com/articles/Champion2.pdf) , May 2003, at 24

"It is easy to assume that any past problems with DNA evidence have been worked out and that the tests are now unassailable. The problem with this assumption is that it ignores case-to-case variations in the nature and quality of DNA evidence. Although DNA technology has indeed improved since it was first used just 15 years ago, and the tests have the potential to produce powerful and convincing results, that potential is not realized in every case. Even when the reliability and admissibility of the underlying test is well established, there is no guarantee that a

test will produce reliable results every time it is used. In our experience there often are case-specific issues and problems that greatly affect the quality and relevance of DNA test results. In those situations, DNA evidence is far less probative than it might initially appear.

The criminal justice system presently does a poor job of distinguishing unassailably powerful DNA evidence from weak, misleading DNA evidence. The fault for that serious lapse lies partly with those defense lawyers who fail to evaluate the DNA evidence adequately in their cases. This article describes the steps that a defense lawyer should take in cases that turn on DNA evidence in order to ascertain whether and how this evidence should be challenged.

Our focus here is on the most widely used form of DNA testing, which examines genetic variants called short tandem repeats, or STR's. Our goal is to explain what you need to know, why you need to know it, and how you get the materials and help you need. We leave for a future article discussion of another less common and even more problematic form of DNA testing, which examines mitochondrial DNA (mtDNA)."

[Forensic DNA Statistics: Still Controversial in Some Cases \(file://localhost:/Forensic%2520DNA%2520Statistics/%2520Still%2520Controversial%2520in%2520Some%2520Cases\)](file://localhost:/Forensic%2520DNA%2520Statistics/%2520Still%2520Controversial%2520in%2520Some%2520Cases) , Champion, Dec. 2012, at 12

"Although forensic DNA testing is well established, experts sometimes disagree about the interpretation and statistical characterization of test results. This article will describe the key controversies and will explain what lawyers need to know to recognize controversial types of DNA evidence. The focus is on low-template or low-copy number (LCN) DNA testing."

[Limitations of Forensics as Standalone Evidence of Guilt \(http://www.law.com/jsp/article.jsp?id=1202458688335\)](http://www.law.com/jsp/article.jsp?id=1202458688335) , N.Y.L.J., May 24, 2010, at 5

"When the principal, and perhaps sole, proof of guilt is a forensic test, such as DNA or fingerprint matching, there is a risk that credibility inflation or a "CSI" effect might unduly influence the jury. This is a cautionary tale about the dangers of allowing convictions to rest primarily on a single type of forensic identification evidence without meaningful corroboration.

New concepts like "bacterial profiles" (allowing identification from the bacteria left by a person's hands) and "forensic molecular photofitting" (generating an image from a DNA sample) might one day join the growing catalog of forensic detecting and identification tools. And before more additions to this genre of evidence attain an air of infallibility, it is necessary to consider the limitations of current "gold standard" forensics as standalone evidence of guilt."

[Tarnish on the 'Gold Standard': Understanding Recent Problems in Forensic DNA Testing \(http://www.nasams.org/forensics/for_lib/Documents/1138913547.79/DNA%20Problems1.pdf\)](http://www.nasams.org/forensics/for_lib/Documents/1138913547.79/DNA%20Problems1.pdf) , Champion, Jan./Feb. 2006, at 10

"DNA evidence has long been called "the gold standard" of forensic science. Most people believe it is virtually infallible—that it either produces the right result or no result. But this belief is difficult to square with recent news stories about errors in DNA testing. An extraordinary number of problems related to forensic DNA evidence have recently come to light."

STANDARDS

[Biological Evidence Preservation Handbook: Best Practices for Evidence Handlers \(http://www.nij.gov/pubs-sum/nist-biological-evidence-preservation.htm\)](http://www.nij.gov/pubs-sum/nist-biological-evidence-preservation.htm) (NIJ 2013)

"The Biological Evidence Preservation Handbook: Best Practices for Evidence Handlers, created by the Technical Working Group on Biological Evidence Preservation, offers guidance for individuals involved in the collection, examination, tracking, packaging, storing and disposition of

biological evidence. This may include crime scene technicians, law enforcement officers, healthcare professionals, forensic scientists, forensic laboratory managers, evidence supervisors, property managers, storage facility personnel, lawyers, testifying experts, court staff members and anyone else who may come in contact with biological evidence. While many of the recommendations relate to the physical storage, preservation, and tracking of evidence at the storage facility, this handbook also covers the transfer of the material between the storage facility and other locations and discusses how the evidence should be handled at these other locations."

FBI DNA Laboratory: A Review of Protocol and Practice Vulnerabilities (<http://www.justice.gov/oig/special/0405/index.htm>) (OIG 2004) [PDF (<http://www.usdoj.gov/oig/special/0405/final.pdf>)]

"This report describes the results of the OIG's review. Our objectives were twofold: 1) to analyze the vulnerability of the protocols in the FBI Laboratory's DNA Analysis Unit I (DNAUI) - the unit where Blake (<http://www.justice.gov/oig/special/0405/chapter4.htm>) worked - to undetected inadvertent or willful noncompliance by DNAUI staff members; and 2) to assess the DNAUI's application of the protocols identified as vulnerable. The report also examines and notes several areas of concern with regard to FBI management's response to Blake's misconduct."

National Protocol for Sexual Assault Medical Forensic Examinations Adults Adolescents (<https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf>) (2nd ed. 2013 DOJ DNA Initiative)

"Since this protocol was initially released in 2004, the "state of the art" for forensic medical examinations has improved. This revised edition of the protocol has the same emphasis and values as the original but has been updated to reflect current technology and practice. It has also been updated to include additional information reflecting changes from the Violence Against Women Act of 2005. It also includes minor technical changes identified in May, 2013."

Standards on DNA Evidence (http://www.americanbar.org/publications/criminal_justice_section_archive/crimjust_standards_dnaevidence.html) (3rd ed. 2007)

"Standard 1.1 Scope of Standards. (a) For purposes of these standards, DNA evidence is biological material from which DNA is or can be extracted. (b) These Standards are applicable to DNA evidence used for genetic identification in criminal cases.

Standard 1.2 General Principles. (a) Consistent with rights of privacy and due process, DNA evidence should be collected, preserved, tested, and used when it may advance the determination of guilt or innocence. (b) DNA evidence should be collected, preserved and tested, and the test results interpreted, in a manner designed to ensure the highest degree of accuracy and reliability. (c) The policies and procedures employed for testing DNA evidence should be available for public inspection. (d) Test results and their interpretation should be reported and presented in an accurate, fair, complete, and clear manner. (e) A person charged with or convicted of a crime should be provided reasonable access to relevant DNA evidence and, if it has been tested, to the test results and their interpretation. (f) The collection and preservation of, access to, and use of DNA evidence should be regulated to prevent inappropriate intrusion on privacy rights. (g) Funding necessary to achieve these principles should be provided."

REPORTS

Collecting DNA at Arrest: Policies, Practices, and Implications (<http://www.urban.org/uploadedpdf/412831-Collecting-DNA-at-Arrest-Policies-Practices-and-Implications-Report.pdf>) (Urban Institute 2013)

"Notwithstanding its potential as an investigative tool, collecting DNA from arrestees raises legal and logistical issues that warrant special study. In fact, courts in several states have overturned their arrestee DNA laws, and the US Supreme Court will address the constitutionality of arrestee DNA laws. To assess the effects and implications of expanding DNA collection to include

arrestees, Urban Institute (UI) researchers examined what arrestee DNA laws require, how the courts have interpreted them, and how they have been implemented by state laboratories and collecting agencies. The study also explored how the practice has affected the growth of databases, the number of hits to forensic profiles, and the frequency with which DNA aids investigations. UI researchers employed complementary data collection methods, including: (1) reviewing relevant statutes and case law; (2) interviewing state and federal CODIS (Combined DNA Index System) laboratory staff, key stakeholders, and other forensic experts; and (3) collecting descriptive data from state laboratories."

[Collecting DNA from Juveniles](http://www.urban.org/UploadedPDF/417487-Collecting-DNA-from-Juveniles.pdf) (<http://www.urban.org/UploadedPDF/417487-Collecting-DNA-from-Juveniles.pdf>) (Urban Institute 2011)

"Collecting DNA from Juveniles, prepared by the Urban Institute (UI) for the National Institute of Justice (NIJ), examines the laws, policies, and practices related to juvenile DNA collection, as well as their implications for the juvenile and criminal justice systems. DNA evidence has proven valuable in helping to solve crimes, motivating a concerted effort to expand the categories of offenders who must provide DNA samples for analysis and inclusion in the Combined DNA Index System (CODIS), the FBI-operated national database. Increasingly, states have required juveniles, mostly those adjudicated delinquent but also some arrestees, to submit DNA samples. While some people have voiced objections to requiring juvenile DNA collection, there generally has been very little consideration given to how the laws should address the special circumstances and protections associated with juvenile offenders."

[DNA for the Defense Bar](https://www.ncjrs.gov/pdffiles1/nij/237975.pdf) (<https://www.ncjrs.gov/pdffiles1/nij/237975.pdf>) (NIJ 2012)

"This is the fourth publication in a series designed to increase the field's understanding of the science of DNA and its application in the courtroom. . . . DNA for the Defense Bar is specifically designed for criminal defense attorneys. NIJ engaged an impressive multidisciplinary team to produce the most up-to-date information possible in the ever-evolving arena of forensic DNA."

[DNA Technology in Forensic Science](http://www.nap.edu/catalog.php?record_id=1866) (http://www.nap.edu/catalog.php?record_id=1866) (NRC 1992)

"Matching DNA samples from crime scenes and suspects is rapidly becoming a key source of evidence for use in our justice system. DNA Technology in Forensic Science offers recommendations for resolving crucial questions that are emerging as DNA typing becomes more widespread. The volume addresses key issues: Quality and reliability in DNA typing, including the introduction of new technologies, problems of standardization, and approaches to certification. DNA typing in the courtroom, including issues of population genetics, levels of understanding among judges and juries, and admissibility. Societal issues, such as privacy of DNA data, storage of samples and data, and the rights of defendants to quality testing technology. Combining this original volume with the new update--The Evaluation of Forensic DNA Evidence--provides the complete, up-to-date picture of this highly important and visible topic. This volume offers important guidance to anyone working with this emerging law enforcement tool: policymakers, specialists in criminal law, forensic scientists, geneticists, researchers, faculty, and students."

[DNA Testing in Criminal Justice: Background, Current Law, Grants, and Issues](http://www.fas.org/sgp/crs/misc/R41800.pdf) (<http://www.fas.org/sgp/crs/misc/R41800.pdf>) (CRS 2012)

"In the 1990s and the early part of the last decade, most of the debate in Congress focused on the scope of DNA databases, reducing the backlog of DNA casework, and providing access to postconviction DNA testing. Most of the debate about the scope of DNA databases faded away with the enactment of the Violence Against Women and Department of Justice Reauthorization Act of 2005 (P.L. 109-162), which expanded federal collection statutes to include anyone arrested

or detained under the authority of the United States. The act also expanded the scope of the national database to include DNA profiles of individuals arrested for state crimes. However, concerns about the backlog of DNA casework and access to post-conviction testing have persisted. In addition, new issues related to the use of DNA in criminal justice have emerged, including whether (1) DNA databases should be used to conduct familial searches, (2) sexual assault evidence collection kits (i.e., "rape kits") should be standardized, and (3) there should be national accreditation standards for forensic laboratories."

Effects of DNA Databases on Crime (<http://www.batten.virginia.edu/content/2013-001-effects-dna-databases-crime-jennifer-doleac-860>) (Frank Batten School of Leadership and Public Policy Working Paper 2013-001)

"Since 1988, every US state has established a database of criminal offenders' DNA profiles. These databases have received widespread attention in the media and popular culture, but this paper provides the first rigorous analysis of their impact on crime. DNA databases are distinctive for two reasons: (1) They exhibit enormous returns to scale, and (2) they work mainly by increasing the probability that a criminal is punished rather than the severity of the punishment. I exploit the details and timing of state DNA database expansions in two ways, first to address the effects of DNA profiling on individuals' subsequent criminal behavior and then to address the impacts on crime rates and arrest probabilities. I first show that profiled violent offenders are more likely to return to prison than similar, unprofiled offenders. This suggests that the higher probability of getting caught outweighs the deterrent effect of DNA profiling. I [[Jennifer L. Doleac](http://www.jenniferdoleac.com/) (<http://www.jenniferdoleac.com/>)] then show that larger DNA databases reduce crime rates, especially in categories where forensic evidence is likely to be collected at the scene—e.g., murder, rape, assault, and vehicle theft. The probability of arresting a suspect in new crimes falls as databases grow, likely due to selection effects. Back-of-the-envelope estimates of the marginal cost of preventing each crime suggest that DNA databases are much more cost-effective than other common law enforcement tools."

Evaluation of Forensic DNA Evidence (http://www.nap.edu/catalog.php?record_id=5141) (NRC 1996)

"In 1992 the National Research Council issued **DNA Technology in Forensic Science** (http://www.nap.edu/catalog.php?record_id=1866), a book that documented the state of the art in this emerging field. Recently, this volume was brought to worldwide attention in the murder trial of celebrity O. J. Simpson. The Evaluation of Forensic DNA Evidence reports on developments in population genetics and statistics since the original volume was published. The committee comments on statements in the original book that proved controversial or that have been misapplied in the courts. This volume offers recommendations for handling DNA samples, performing calculations, and other aspects of using DNA as a forensic tool--modifying some recommendations presented in the 1992 volume. The update addresses two major areas: Determination of DNA profiles. The committee considers how laboratory errors (particularly false matches) can arise, how errors might be reduced, and how to take into account the fact that the error rate can never be reduced to zero. Interpretation of a finding that the DNA profile of a suspect or victim matches the evidence DNA. The committee addresses controversies in population genetics, exploring the problems that arise from the mixture of groups and subgroups in the American population and how this substructure can be accounted for in calculating frequencies. This volume examines statistical issues in interpreting frequencies as probabilities, including adjustments when a suspect is found through a database search. The committee includes a detailed discussion of what its recommendations would mean in the courtroom, with numerous case citations. By resolving several remaining issues in the evaluation of this increasingly important area of forensic evidence, this technical update will be important to forensic scientists and population geneticists--and helpful to attorneys, judges, and others who need to understand DNA and the law. Anyone working in laboratories and in the courts or anyone

studying this issue should own this book."

[Forensic DNA Fundamentals for the Prosecutor: Be Not Afraid](http://www.ndaa.org/pdf/forensic_dna_fundamentals.pdf) (http://www.ndaa.org/pdf/forensic_dna_fundamentals.pdf) (APRI 2003)

"This publication serves as a primer for prosecutors on the basics of DNA. The application of the science and the math, trial issues and potential defense challenges that prosecutors face in DNA cases will be addressed in detail."

[Human DNA Identity Testing Policy Report](http://sites.duke.edu/ihss/files/2012/03/DNA-Policy-24Jan13_psg-sk.pdf) (http://sites.duke.edu/ihss/files/2012/03/DNA-Policy-24Jan13_psg-sk.pdf) (Institute for Homeland Security Solutions 2013)

"The use of DNA for government purposes is fraught with concerns over privacy and intended use of provided DNA specimens. The collection and use of DNA of noncriminals can raise questions of Fourth Amendment violations in the United States. The existing policies have not been resolved in courts or legal opinions, although the U.S. Supreme Court is set to hear a case on arrestee collection in February 2013. It is clear, however, that policies involving DNA collection are subject to intense scrutiny and care must be taken to protect the privacy of provided specimens and define the intended uses of specimens and the resulting profiles. As U.S. authorities consider approaches to incorporating DNA profiling into migration procedures, they must tackle the concerns for (1) retention of specimens; (2) use of stored specimens; (3) security and access to specimens; (4) security and access to DNA profiles; and (5) cross-border searching and exchange of profiles."

[Identifying Victims Using DNA: A Guide for Families](http://www.nij.gov/pubs-sum/209493.htm) (<http://www.nij.gov/pubs-sum/209493.htm>) (NIJ 2005)

"This 8-page booklet explains the process of identifying remains using DNA analysis. It gives an overview of the process so that surviving family and friends will understand what DNA analysis can and cannot do, describes the sources of DNA that forensic scientists might use, and explains the differences between nuclear and mitochondrial DNA."

[Mass Fatality Incidents: A Guide for Human Forensic Identification](http://www.nij.gov/pubs-sum/199758.htm) (<http://www.nij.gov/pubs-sum/199758.htm>) (NIJ 2005)

"In a mass fatality incident, correct victim identification is essential to satisfy humanitarian considerations, meet civil and criminal investigative needs, and identify victim perpetrators. This 96-page Special Report provides medical examiners/coroners with guidelines for preparing the portion of the disaster plan concerned with victim identification and summarizes the victim identification process for other first responders. It discusses the integration of the medical examiner/coroner into the initial response process, and presents the roles of various forensic disciplines (including forensic anthropology, radiology, odontology, fingerprinting, and DNA analysis) in victim identification. This guide represents the experience of dozens of Federal, State, international, and private forensic experts who took part in the Technical Working Group for Mass Fatality Forensic Identification."

SCIENTIFIC STUDIES

[Authentication of Forensic DNA Samples](http://www.fsigenetics.com/article/S1872-4973(09)00099-4/abstract) ([http://www.fsigenetics.com/article/S1872-4973\(09\)00099-4/abstract](http://www.fsigenetics.com/article/S1872-4973(09)00099-4/abstract)) , 4 Forensic Sci. Int'l: Genetics, 95 (Feb. 2010)

"Over the past twenty years, DNA analysis has revolutionized forensic science, and has become a dominant tool in law enforcement. Today, DNA evidence is key to the conviction or exoneration of suspects of various types of crime, from theft to rape and murder. However, the disturbing possibility that DNA evidence can be faked has been overlooked. It turns out that standard molecular biology techniques such as PCR, molecular cloning, and recently developed whole

genome amplification (WGA), enable anyone with basic equipment and know-how to produce practically unlimited amounts of in vitro synthesized (artificial) DNA with any desired genetic profile. This artificial DNA can then be applied to surfaces of objects or incorporated into genuine human tissues and planted in crime scenes. Here we show that the current forensic procedure fails to distinguish between such samples of blood, saliva, and touched surfaces with artificial DNA, and corresponding samples with in vivo generated (natural) DNA. Furthermore, genotyping of both artificial and natural samples with Profiler Plus(R) yielded full profiles with no anomalies. In order to effectively deal with this problem, we developed an authentication assay, which distinguishes between natural and artificial DNA based on methylation analysis of a set of genomic loci: in natural DNA, some loci are methylated and others are unmethylated, while in artificial DNA all loci are unmethylated. The assay was tested on natural and artificial samples of blood, saliva, and touched surfaces, with complete success. Adopting an authentication assay for casework samples as part of the forensic procedure is necessary for maintaining the high credibility of DNA evidence in the judiciary system."

[Biobanking and Deceased Persons \(http://link.springer.com/article/10.1007/s00439-011-1049-y\)](http://link.springer.com/article/10.1007/s00439-011-1049-y) , 130 Human Genetics 415 (Sept. 2011)

"Early biomedical research focused primarily on the study of specific diseases or sets of diseases within small groups of living research participants. Accordingly, the first ethical frameworks governing biomedical research addressed short-term, limited-scope research involving living research participants. Due to recent interest in longitudinal population studies and biobanking, research is increasingly long term. This shift raises several ethical and legal issues concerning the impact of a participant's death on research. This paper offers an overview of these issues in the context of longitudinal biobanking genetic research. Our first part outlines the legal and ethical frameworks that govern the effect of the participants' death on consent. This will be followed by an analysis of the legal and ethical frameworks that govern the secondary use of deceased participants' data and samples and the return of deceased participants' individual research results to biological family members. In our second part, we will review the current literature and discuss the above mentioned issues using the bioethics "principlism" theory before concluding."

[Encyclopedia of DNA Elements \(http://www.genome.gov/10005107\)](http://www.genome.gov/10005107) (ENCODE)⁴
([features/dnaevidence.htm#_ftn4](http://www.genome.gov/10005107/features/dnaevidence.htm#_ftn4))

"The National Human Genome Research Institute (NHGRI) launched a public research consortium named ENCODE, the Encyclopedia of DNA Elements, in September 2003, to carry out a project to identify all functional elements in the human genome sequence. The project started with two components - a pilot phase and a technology development phase.

The pilot phase tested and compared existing methods to rigorously analyze a defined portion of the human genome sequence (See: [ENCODE Pilot Project \(http://www.genome.gov/26525202\)](http://www.genome.gov/26525202)). The conclusions from this pilot project were published in June 2007 in [Nature](http://www.genome.gov/Pages/Research/ENCODE/nature05874.pdf) (<http://www.genome.gov/Pages/Research/ENCODE/nature05874.pdf>) and [Genome Research](http://genome.cshlp.org/content/17/6.toc) (<http://genome.cshlp.org/content/17/6.toc>) . The findings highlighted the success of the project to identify and characterize functional elements in the human genome. The technology development phase also has been a success with the promotion of several new technologies to generate high throughput data on functional elements.

With the success of the initial phases of the ENCODE Project, NHGRI funded new awards in September 2007 to scale the ENCODE Project to a production phase on the entire genome along with additional pilot-scale studies. Like the pilot project, the ENCODE production effort is

organized as an open consortium and includes investigators with diverse backgrounds and expertise in the production and analysis of data (See: [ENCODE Participants and Projects \(http://www.genome.gov/26525220\)](http://www.genome.gov/26525220)). This production phase also includes a [Data Coordination Center \(http://genome.ucsc.edu/ENCODE/\)](http://genome.ucsc.edu/ENCODE/) to track, store and display ENCODE data along with a Data Analysis Center to assist in integrated analyses of the data. All data generated by ENCODE participants will be rapidly released into public databases (See: [Accessing ENCODE Data \(http://www.genome.gov/10005107#4\)](http://www.genome.gov/10005107#4)) and available through the project's Data Coordination Center."

[Genetic Links Found Among Five Psychiatric Disorders \(http://psychnews.psychiatryonline.org/newsarticle.aspx?articleid=1676238\)](http://psychnews.psychiatryonline.org/newsarticle.aspx?articleid=1676238) , Psych. News, Apr. 5, 2013

"A new study presents the first evidence that genetic risk factors are shared by a diverse set of psychiatric disorders, perhaps setting the stage for a new classification scheme. A study that's being characterized as the largest genetic study of psychiatric illness ever undertaken could someday result in psychiatric disorders being classified on the basis of biomarkers, rather than descriptive syndromes.

The [Psychiatric Genomics Consortium \(https://pgc.unc.edu/index.php\)](https://pgc.unc.edu/index.php) was formed in 2007 to conduct meta-analyses of genomewide association studies (GWAS) for psychiatric disorders. The consortium's Cross-Disorder Group presented its first publication online February 28 in the *Lancet*, detailing the results of efforts to examine the possibility of common genetic markers or single-nucleotide polymorphisms (SNPs) that might affect susceptibility to autism spectrum disorder, attention-deficit/hyperactivity disorder, bipolar disorder, major depressive disorder, and schizophrenia."

[Identifying Personal Genomes by Surname Inference \(http://www.sciencemag.org/content/339/6117/321.abstract?sid=f116df72-ca09-4e9b-9039-b10021a22af4\)](http://www.sciencemag.org/content/339/6117/321.abstract?sid=f116df72-ca09-4e9b-9039-b10021a22af4) , 339 *Sci.* 321 (Jan. 2013)

"Sharing sequencing data sets without identifiers has become a common practice in genomics. Here, we report that surnames can be recovered from personal genomes by profiling short tandem repeats on the Y chromosome (Y-STRs) and querying recreational genetic genealogy databases. We show that a combination of a surname with other types of metadata, such as age and state, can be used to triangulate the identity of the target. A key feature of this technique is that it entirely relies on free, publicly accessible Internet resources. We quantitatively analyze the probability of identification for U.S. males. We further demonstrate the feasibility of this technique by tracing back with high probability the identities of multiple participants in public sequencing projects."

[Research Leads to Portable DNA Testing Device \(http://phys.org/news/2013-07-portable-dna-device.html\)](http://phys.org/news/2013-07-portable-dna-device.html) , Phys.Org , July 9, 2013

"That "lab-on-a-chip" technology, which aims to miniaturize and streamline the chemical processes involved in DNA testing and other biochemical analyses, led to the founding in 2003 of a U. Va. start-up company, MicroLab Diagnostics. Essentially, its goal was to build an entire lab on a single chip reliant on microfluidic technology."

[Subjectivity and Bias in Forensic DNA Mixture Interpretations \(http://www.cognitiveconsultantsinternational.com/Dror_SJ_Subjectivity_and_bias_in_DNA_mixture_interpretation.pdf\)](http://www.cognitiveconsultantsinternational.com/Dror_SJ_Subjectivity_and_bias_in_DNA_mixture_interpretation.pdf) , 51 *Sci. Justice* 204 (2011)

"The objectivity of forensic science decision making has received increased attention and scrutiny. However, there are only a few published studies experimentally addressing the potential for contextual bias. Because of the esteem of DNA evidence, it is important to study and assess the impact of subjectivity and bias on DNA mixture interpretation. The study reported here

presents empirical data suggesting that DNA mixture interpretation is subjective. When 17 North American expert DNA examiners were asked for their interpretation of data from an adjudicated criminal case in that jurisdiction, they produced inconsistent interpretations. Furthermore, the majority of 'context free' experts disagreed with the laboratory's pre-trial conclusions, suggesting that the extraneous context of the criminal case may have influenced the interpretation of the DNA evidence, thereby showing a biasing effect of contextual information in DNA mixture interpretation."

[Toward a Comparison of DNA Profiling and Databases in the United States and England](http://www.rand.org/pubs/technical_reports/TR918.html) (http://www.rand.org/pubs/technical_reports/TR918.html) (Rand 2010)

"Many senior U.S. law enforcement officials believe that the English criminal justice system has capitalized more fully on the crime-fighting potential of forensic DNA evidence than the U.S. criminal justice system. They contend that the English system is much faster at testing DNA samples and at uploading the test results into its forensic DNA database and that the English national DNA database provides more database hits that might help law enforcement solve and prevent crimes. Members of the RAND Center on Quality Policing (CQP) asked RAND researchers to explore the forensic DNA analysis systems in England and the United States to find out whether these perceptions are accurate. This report presents CQP's best efforts to undertake this comparative analysis, which was severely hampered by a lack of data on the U.S. and English forensic DNA systems and the unwillingness of some U.S. agencies to share their data. The authors make use of the limited available information to undertake comparisons of the two systems, highlighting the limitations of these comparisons. Additionally, they discuss broader issues that arose during the course of the analysis as to the appropriate metrics that should be used for comparison and the contextual factors that they think should be taken into account in any international comparison of DNA database systems."

TRAINING MATERIALS

[NIJ Training: Crime Science and DNA Basics for Forensic Analysts](http://nij.gov/training/courses/analyst-crime-scene.htm) (<http://nij.gov/training/courses/analyst-crime-scene.htm>)

"This course provides information in the two modules Evidence at the Crime Scene and History and Types of Forensic DNA Testing. The first module addresses the importance of documenting, protecting, and preserving the scene and what types of evidence can be found there and methods used for its collection and preservation. The second module addresses the historical use and disadvantages of restriction fragment length polymorphisms (RFLP), the method and sequence of steps in which DNA profiles are developed, and the concept of short tandem repeats (STR) testing and its advantages over earlier methods."

[NIJ Training: DNA -- A Prosecutor's Practice Notebook](http://nij.gov/training/dna-prosecutors-notebook.htm) (<http://nij.gov/training/dna-prosecutors-notebook.htm>) (2012)

"This free, self-paced, online training is designed to assist State and local prosecutors in preparing DNA-related cases for prosecution. The lessons cover a wide spectrum of topics relating to the science of DNA and its legal application in the courtroom. Lessons include: * Investigating Cases Involving DNA * Preparing Cases Involving DNA * Presenting Cases Involving DNA * Special Case Circumstances * Lab Report Analysis."

[NIJ Training: Forensic DNA for Decisionmakers](http://nij.gov/training/dna-decisionmakers.htm) (<http://nij.gov/training/dna-decisionmakers.htm>) (2012)

"The objectives of the course are to educate senior-level law enforcement decisionmakers on the policy and practice issues associated with the effective use of DNA analysis so they will have the knowledge to: * Streamline investigative processes * Implement best practices for handling "cold

hits"* Identify the probative value of evidence and prioritize DNA evidence * More effectively leverage limited resources * Interact more efficiently with crime laboratories to set expectations and manage caseloads * Understand the time and resources required from the lab to test different categories of evidence * Avoid the steep costs that can impact the agency, the public and the practitioner's career if procedures aren't properly implemented."

[NIJ Training: Law 101 - Legal Guide for the Forensic Expert \(http://nij.gov/training/courses/law-101.htm\)](http://nij.gov/training/courses/law-101.htm)

"This course provides 13 modules and this introduction which is designed to give a comprehensive discussion of recommended practices for the forensic expert to follow when preparing for and testifying in court. Because laws may vary from jurisdiction to jurisdiction, experts are advised to check with local attorney(s) and become familiar with the laws applicable in the court where they will testify. The thirteen modules include: * Sources of Scientific Evidence * Report Writing and Supporting Documentation * Importance of Case Preparation * Subpoenas vs. Promises to Appear * Affidavits * Being a Court-Appointed Expert * Discovery * General Testifying Tips * Depositions * Pretrial * Trial * Post-Trial, Pre-Sentencing * Ethics for Experts."

[NIJ Training: Principles of Forensic DNA for Officers of the Court \(http://nij.gov/training/dna-officers-court.htm\)](http://nij.gov/training/dna-officers-court.htm)

"An interactive, self-paced, resource tool to educate and assist prosecutors, defense attorneys, and judges in forensic DNA cases. The course consists of fifteen modules and covers: * The biology of DNA, including statistics and population genetics. * DNA laboratories, quality assurance in testing, and understanding a laboratory report. * Forensic databases. * Victim issues. * The presentation of DNA evidence at trial. * Post-conviction DNA cases.

Accompanying Case Study: The case study, in conjunction with this course, provides valuable information about the science of DNA and DNA testing. It draws upon a 1984 rape and murder that while cold for many years was reopened and investigated resulting in a criminal trial based largely upon DNA evidence. The case study, while fictional, is based upon factual events."

NEWS ARTICLES

[Are DNA Profiles the New Social Security Number? \(http://www.huffingtonpost.com/brandon-l-garrett/the-new-social-security-number_b_3386622.html\)](http://www.huffingtonpost.com/brandon-l-garrett/the-new-social-security-number_b_3386622.html) , Huffington Post, June 4, 2013

"When the Supreme Court ruled yesterday in *Maryland v. King*, a 5-4 decision, that the Constitution allows police to take DNA from arrestees, the majority opinion planted seeds that can ripen into what privacy advocates long foretold: routine, possibly universal, collection of DNA from people regardless of whether police have any reason to suspect them of criminal activity. How can this be?"

[Bits of Mystery DNA, Far From 'Junk,' Play Crucial Role \(http://www.nytimes.com/2012/09/06/science/far-from-junk-dna-dark-matter-proves-crucial-to-health.html?pagewanted=all\)](http://www.nytimes.com/2012/09/06/science/far-from-junk-dna-dark-matter-proves-crucial-to-health.html?pagewanted=all) , N.Y. Times, Sept. 6, 2012, at A1

"Now scientists have discovered a vital clue to unraveling these riddles. The human genome is packed with at least four million gene switches that reside in bits of DNA that once were dismissed as "junk" but that turn out to play critical roles in controlling how cells, organs and other tissues behave. The discovery, considered a major medical and scientific breakthrough, has enormous implications for human health because many complex diseases appear to be caused by tiny changes in hundreds of gene switches."

[Britain Plans World's First Go-Ahead for '3-Parent' IVF Babies \(http://www.reuters.com/article/2013/06/28/us-mitochondria-britain-idUSBRE95Q1J020130628\)](http://www.reuters.com/article/2013/06/28/us-mitochondria-britain-idUSBRE95Q1J020130628) , Reuters, June 28, 2013

"Britain is planning to become the first country in the world to offer controversial "three-parent" fertility treatments to families who want to avoid passing on incurable diseases to their children. . . . The potential treatment is known as three-parent in vitro fertilization (IVF) because the offspring would have genes from a mother, a father and from a female donor."

[Could a New Leicester Innovation Spell The End of the 'Cat' Burglar?](http://www2.le.ac.uk/news/blog/2013/august/could-a-new-leicester-innovation-spell-the-end-of-the-201ccat201d-burglar) (<http://www2.le.ac.uk/news/blog/2013/august/could-a-new-leicester-innovation-spell-the-end-of-the-201ccat201d-burglar>) , U. Leicester News, Aug. 14, 2013

"Cat-loving criminals beware: Leicester geneticists have developed the UK's first cat DNA database, which has already been used to convict a killer. Could a new Leicester innovation spell the end of the 'cat' burglar? Criminals around the UK may have to say goodbye to their beloved cats. A new cat DNA database developed by Leicester genetics experts means cats can now provide forensic evidence to help put their masters behind bars. [Dr Jon Wetton](http://www2.le.ac.uk/projects/impact-of-diasporas/the-research-group/research-associates/jon-wetton) (<http://www2.le.ac.uk/projects/impact-of-diasporas/the-research-group/research-associates/jon-wetton>) , of the University's Department of Genetics, has led a project to compile a database of DNA from 152 cats around the country."

[Dark Side of DNA Evidence](http://www.thenation.com/article/173554/dark-side-dna-evidence) (<http://www.thenation.com/article/173554/dark-side-dna-evidence>) , The Nation, Apr. 15, 2013

"Many criminal procedures, no matter their original intent, disproportionately affect people of color. An amicus brief filed by Howard University provides three examples: the "war on drugs" and two of its symptoms, the New York Police Department's "stop-and-frisk" policy, and pretextual traffic stops—in which police seize on minor violations for the chance to investigate "suspicious" drivers. . . .

Because African-Americans are significantly overrepresented in CODIS, it is possible to use the database to identify up to 17 percent of the country's entire African-American population, researchers at [Duke University's Center for Genome Ethics, Law and Policy](http://www.genome.duke.edu/) (<http://www.genome.duke.edu/>) found in 2011. Although only four states explicitly permit familial searches, the ACLU has found that nineteen have used a partial match to connect an unknown sample with a potential relative of someone in CODIS—even though fifteen of those states prohibit using the database for this purpose. In California, which permits familial searching, an "initial candidate list" of up to 168 people is created. That list is then narrowed and nonrelatives removed. A potential relative who remains on the list becomes vulnerable to police investigation. This is why Howard University's brief calls these efforts a "'probable cause' generator."

[DNA 'Fog' Marks Criminals Invisibly for Later ID](http://news.discovery.com/tech/biotechnology/dna-fog-marks-criminals-130606.htm) (<http://news.discovery.com/tech/biotechnology/dna-fog-marks-criminals-130606.htm>) , Discovery News, June 6, 2013

"For years banks have rigged bags of money with exploding dye packs, which show the cash was stolen and mark the thief. Now DNA can do the same job -- without the suspect being aware of it. This isn't using the criminal's own DNA to track him or her -- it's engineered, artificial gene sequences that act like bar codes. They can be applied to goods or people to uniquely identify them, and be made to glow under certain kinds of light or be read by swabbing them and reading the sequence chemically."

[DNA From Arrested Suspects Is Like Any Valid Booking Process, SCOTUS Says](http://www.abajournal.com/magazine/article/dna_from_arrested_suspects_is_like_any_valid_booking_process_the_court_says/) (http://www.abajournal.com/magazine/article/dna_from_arrested_suspects_is_like_any_valid_booking_process_the_court_says/) , ABA J Law News Now, Aug. 1, 2013

"At February's oral argument in *Maryland v. King*, about whether the police may take samples of DNA from people arrested for certain crimes, Justice Samuel A. Alito Jr. said it was "perhaps the

most important criminal procedure case this court has heard in decades." He suggested that such DNA swabs were "the fingerprinting of the 21st century."

The Supreme Court's decision in the case, issued in June, pretty much lived up to that billing. Justice Anthony M. Kennedy wrote for a 5-4 court that in an arrest for a serious offense backed by probable cause, "taking and analyzing a cheek swab of the arrestee's DNA is, like fingerprinting and photographing, a legitimate police booking procedure that is reasonable under the Fourth Amendment." . . . The King decision drew equally sharp responses among legal observers."

[DSHS Turned Over Hundreds of DNA Samples to Feds](http://www.texastribune.org/texas-state-agencies/department-of-state-health-services/dshs-turned-over-hundreds-of-dna-samples-to-feds/) (<http://www.texastribune.org/texas-state-agencies/department-of-state-health-services/dshs-turned-over-hundreds-of-dna-samples-to-feds/>) , Tex. Trib., Feb. 22, 2010

"A Texas Tribune review of nine years' worth of e-mails and internal documents on the Department of State Health Services' newborn blood screening program reveals the transfer of hundreds of infant blood spots to an Armed Forces lab to build a national and, someday, international mitochondrial DNA (mtDNA) registry. The records, released after the state agreed in December to destroy more than 5 million infant blood spots, also show an effort to limit the public's knowledge of aspects of the newborn blood program, and to manage the debate around it. But the plaintiffs who filed the lawsuit never saw them, because the state settled the case so quickly that it never reached the discovery phase."

[Finding the Unique in You to Build a Better Password](http://bits.blogs.nytimes.com/2011/12/23/finding-the-unique-in-you-to-build-a-better-password/) (<http://bits.blogs.nytimes.com/2011/12/23/finding-the-unique-in-you-to-build-a-better-password/>) , N.Y. Times, Dec. 23, 2011

"In its recent forecast for 2012, I.B.M. predicts that we may never need a password again: "Biometric data – facial definitions, retinal scans and voice files – will be composited through software to build your DNA unique online password," the company said in a blog post."

[Germany's Phantom Serial Killer: A DNA Blunder](http://www.time.com/time/world/article/0,8599,1888126,00.html) (<http://www.time.com/time/world/article/0,8599,1888126,00.html>) , Time Mag., March. 27, 2009

"It wasn't until earlier this year that investigators figured something had to be very wrong. Trying to establish the identity of a burned corpse found in 2002, they were re-examining the fingerprints of a male asylum seeker taken from his asylum application made many years earlier. The fingerprints contained the Phantom's female DNA. Impossible, they thought, so they repeated the test with a different cotton swab — and this time found no trace of the Phantom's DNA.

This raised suspicions that the DNA found at all the Phantom's crime scenes might be traced to a single innocent factory worker, probably employed to package the swabs. Cotton swabs are sterilized before being used to collect DNA samples, but while sterilizing removes bacteria, viruses and fungi, it does not destroy DNA."

[Government Has Your Baby's DNA](http://www.cnn.com/2010/HEALTH/02/04/baby.dna.government/index.html) (<http://www.cnn.com/2010/HEALTH/02/04/baby.dna.government/index.html>) , CNN, Feb. 4, 2010

"It's simple, the pediatrician answered: Newborn babies in the United States are routinely screened for a panel of genetic diseases. Since the testing is mandated by the government, it's often done without the parents' consent, according to Brad Therrell (<http://genes-r-us.uthscsa.edu/biographies/therrell.htm>) , director of the [National Newborn Screening & Genetics Resource Center](http://genes-r-us.uthscsa.edu/) (<http://genes-r-us.uthscsa.edu/>) . In many states, such as Florida, where Isabel was born, babies' DNA is stored indefinitely, according to the resource center."

[How Innocent Man's DNA Was Found at Killing Scene](http://wrongfulconvictionsblog.org/2013/06) (<http://wrongfulconvictionsblog.org/2013/06>)

[/28/how-innocent-mans-dna-was-found-at-killing-scene/](#) , Wrongful Convictions Blog, June 28, 2013⁵
([features/dnaevidence.htm#_ftn5](#))

"When a San Jose man charged with murdering a Monte Sereno millionaire was suddenly freed last month, prosecutors acknowledged he had an airtight alibi – he was drunk and unconscious at a hospital when the victim was killed in his mansion miles away. But a mystery remained: How did the DNA of 26-year-old Lukis Anderson – who was so drunk his blood alcohol content was five times the legal limit – end up on the fingernails of slaying victim Raveesh "Ravi" Kumra?"

[Leave Me Your DNA ... and I'll 3D-Print Your Face](#) (<http://www.guardian.co.uk/commentisfree/2013/jun/01/dna-art-recreate-faces>) , Guardian, June 1, 2013⁶ ([features/dnaevidence.htm#_ftn6](#))

"Your DNA is as personal as you can get. It has information about you, your family and your future. Now, imagine it is used – without your consent – to create a mask of your face. Working with the DNA bits left behind by strangers, a Brooklyn artist makes us think about issues of privacy and genetic surveillance. [Heather Dewey-Hagborg](#) (<http://deweyhagborg.com/>) , a 30-year-old PhD student studying electronic arts at Rensselaer Polytechnic Institute has the weird habit of gathering the DNA people leave behind, from cigarette butts and fingernails to used coffee cups and chewing gum. She goes to Genspace (New York City's Community Biolab) to extract DNA from the detritus she collects and sequence specific genomic regions from her samples. The data are then fed into a computer program, which churns out a facial model of the person who left the hair, fingernail, cigarette or gum behind. Using a 3D printer, she creates life-sized masks – some of which are coming to a gallery wall near you."

[Miss. Turns to Cord Blood to Track Down Statutory Rapists](#) (<http://www.npr.org/blogs/health/2013/06/03/188423215/miss-turns-to-cord-blood-to-track-down-statutory-rapists>) , NPR, June 3, 2013⁷
([features/dnaevidence.htm#_ftn7](#))

"Mississippi lawmakers have embarked on a controversial campaign to discourage older men from having sex with teenagers. Starting in July, doctors and midwives in the state will be required by law to collect samples of umbilical cord blood from babies born to some girls under the age of 16. Officials will analyze the samples and try to identify the fathers through matches in the state's DNA database."

[New York Examines Over 800 Rape Cases for Possible Mishandling of Evidence](#)
(<http://www.nytimes.com/2013/01/11/nyregion/new-york-reviewing-over-800-rape-cases-for-possible-mishandling-of-dna-evidence.html?pagewanted=all>) , N.Y. Times, Jan. 11, 2013, at A1

"The New York City medical examiner's office is undertaking an unusual review of more than 800 rape cases in which critical DNA evidence may have been mishandled or overlooked by a lab technician, resulting in incorrect reports being given to criminal investigators."

[New York Firm Proposes Using Plant DNA to Thwart Sat Testing Fraud](#) (<http://www.foxnews.com/tech/2012/01/25/new-york-firm-proposes-using-plant-dna-to-thwart-sat-testing-fraud/>) , Fox News, Jan. 25, 2012

"As New York lawmakers consider a bill that would make cheating on the SAT college entrance exam a felony, one company thinks the answer to thwarting testing fraud can be found in molecules of plant DNA embedded into a secure identification card. Dr. James Hayward, president and CEO of Long Island-based Applied DNA Sciences, Inc., said the "absolutely unbreakable" system features a counterfeit-proof identification card that uses molecules of plant DNA segments to authenticate a student's identity. That identification card -- combining the embedded DNA info with an authentic photograph of the student -- forms a one-two identity verification that's impossible to fake or borrow, he said."

[Police Agencies Are Assembling Records of DNA](http://www.nytimes.com/2013/06/13/us/police-agencies-are-assembling-records-of-dna.html?_r=2&) (http://www.nytimes.com/2013/06/13/us/police-agencies-are-assembling-records-of-dna.html?_r=2&) , N.Y. Times, June 13, 2013, at A1

"Slowly, and largely under the radar, a growing number of local law enforcement agencies across the country have moved into what had previously been the domain of the F.B.I. and state crime labs — amassing their own DNA databases of potential suspects, some collected with the donors' knowledge, and some without it. And that trend — coming at a time of heightened privacy concerns after recent revelations of secret federal surveillance of telephone calls and Internet traffic — is expected only to accelerate after the Supreme Court's recent decision upholding a Maryland statute allowing the authorities to collect DNA samples from those arrested for serious crimes."

[Science in Court: DNA's Identity Crisis](http://www.nature.com/news/2010/100317/full/464347a.html) (<http://www.nature.com/news/2010/100317/full/464347a.html>) , Nature, March 17, 2010, at 347

"It may be the gold standard of forensic science, but questions are now being raised about DNA identification from ever-smaller human traces. [Natasha Gilbert](http://www.nature.com/nature/about/editors/) (<http://www.nature.com/nature/about/editors/>) asks how low can you go?"

[Timeline of Problems at the SFPD DNA Lab](http://blogs.sfweekly.com/thesnitch/2010/12/sfspd_dna_lab_timeline.php) (http://blogs.sfweekly.com/thesnitch/2010/12/sfspd_dna_lab_timeline.php) , SF Weekly, Dec. 14, 2010

"Through reporting over the past month, SF Weekly has uncovered multiple instances of scientifically and ethically questionable conduct by DNA analysts at the San Francisco Police Department Crime Laboratory. Our findings focus on two lapses in particular: the destruction of records of a potentially critical mistake in the testing of DNA samples in 2008, and an analyst's misleading report and sworn testimony about DNA evidence in a homicide case. In both episodes, prolonged efforts to conceal analysts' misconduct were made by either crime lab officials or the office of District Attorney Kamala Harris, which presumably feared that disclosure of the problems would jeopardize cases relying on DNA evidence."

[Touch DNA Analysis: Using the Literature to Help Answer Some Common Questions](http://www.forensicmag.com/articles/2012/06/touch-dna-analysis-using-literature-help-answer-some-common-questions) (<http://www.forensicmag.com/articles/2012/06/touch-dna-analysis-using-literature-help-answer-some-common-questions>) , Forensic Mag., June 18, 2012

"With modern technology, the simple act of picking up an object or touching a surface can lead to the identification and apprehension of a criminal. In the past few years, not only have the number of touch DNA evidence items being submitted to the lab for analysis skyrocketed, but the number of journal articles regarding touch DNA and DNA transfer (both primary and secondary) has also increased greatly. This article is intended to update the reader on the latest touch and transfer DNA research and attempts to answer some of the most common questions that are asked regarding the topic."

[Web Hunt for DNA Sequences Leaves Privacy Compromised](http://www.nytimes.com/2013/01/18/health/search-of-dna-sequences-reveals-full-identities.html?_r=0) (http://www.nytimes.com/2013/01/18/health/search-of-dna-sequences-reveals-full-identities.html?_r=0) , N.Y. Times, Jan. 18, 2013, at A15

"The genetic data posted online seemed perfectly anonymous — strings of billions of DNA letters from more than 1,000 people. But all it took was some clever sleuthing on the Web for a genetics researcher to identify five people he randomly selected from the study group. Not only that, he found their entire families, even though the relatives had no part in the study — identifying nearly 50 people."

AMERICAN LAW REPORTS

Admissibility of DNA Identification Evidence, 84 A.L.R.4th 313

"One of the most controversial issues in the law today is the admissibility, in criminal or civil trials, of evidence derived from deoxyribonucleic acid (DNA) identification or "fingerprinting" techniques. These procedures are based on fundamental principles of human genetics (S 2[b]), and were originally developed by molecular biologists to determine the genes responsible for a variety of inherited diseases. Two kinds of tests are now in forensic use: "restriction fragment length polymorphism" (RFLP) analysis (S 2[c]), and "polymerase chain reaction (PCR) amplification," or "allele-specific probe," analysis. (S 2[d]). Both methodologies involve the isolation, identification, and comparison of certain highly distinguishing characteristics in the genetic structure of individuals, as revealed by an analysis of DNA extracted from body fluid or tissue samples, and a statistical calculation of the frequency with which such characteristics could be expected to appear in the population.

DNA testing, which is currently performed by several commercial laboratories and the Federal Bureau of Investigation (FBI), has been advanced as a uniquely effective means (1) to link a suspect to a crime, or to exonerate a wrongly accused suspect, where biological evidence has been left; (2) to resolve disputed parentage in paternity, immigration, and other cases; and (3) to identify human remains. While the methodology employed in DNA identification may be widely used in clinical research, and may offer significant advantages over other means of biological typing (S 2[e]), serious questions have been raised about its forensic application (S 2[f])."

Admissibility in Criminal Case of Blood Alcohol Test Where Blood Was Taken from Unconscious Driver, 72 A.L.R.3d 325

"Quite a few courts have held that there is no violation of a suspect's right against illegal searches and seizures by the extraction of a blood sample from an unconscious driver, even without a showing of an arrest, while others have held that the results of such blood tests had to be suppressed on the ground that there was a violation of that right. Some courts have found the results of a blood test performed upon a sample taken from an unconscious motorist to be admissible because incident to a lawful arrest. California law may be unclear on the search and seizure issue in view of a possible conflict between a recent appellate court decision and an earlier state supreme court case as to the necessity of arresting an unconscious driver before subjecting him to a blood test.

It has generally been held that there is no violation of the privilege against self-incrimination by the admission into evidence of the results of a blood test to which an unconscious motorist has been subjected in cases decided both prior to and subsequent to *Schmerber v California* (1966) 384 US 757, 16 L Ed 908, 86 S Ct 1826, although a few courts have held to the contrary. The contention that the right to counsel has been denied by the extraction of a blood sample from an unconscious motorist has likewise been generally unsuccessful in convincing courts to suppress the results, although it has been successful in one case. Several courts have held that the constitutional guaranty of due process of law is not violated by permitting in a criminal trial the introduction of evidence obtained from a blood test conducted upon an unconscious motorist.

In a few cases involving the question under annotation, the courts have rejected the contention that the taking of a blood sample from an unconscious driver violated his constitutional rights without specifying the particular right involved.

Some courts have specifically applied their states' implied consent laws to the unconscious driver to find the results of blood tests admissible, while others have found them inadmissible under the provisions of their implied consent legislation, either on the grounds that the state had not complied with the express language of the applicable statute, or because such provisions implied a requirement which had not been fulfilled.

The reader is cautioned that in some of the cases discussed in this annotation, the courts ruled on more than one argument supporting or opposing the admissibility into evidence of the results of blood tests performed upon unconscious drivers. In some of these cases, although the courts considered the evidence to be admissible on several grounds, they ultimately held that the evidence was inadmissible on another ground."

Admissibility, in Criminal Case, of Physical Evidence Obtained Without Consent by Surgical Removal from Person's Body, 41 A.L.R.4th 60

"The recent decision of the United States Supreme Court in *Winston v Lee* (1985, US) 84 L Ed 662, 105 S Ct 1611, has established that surgical removal of evidence without the surgery subject's consent, for use in a criminal prosecution, is not per se unreasonable within the meaning of the Fourth Amendment to the Constitution of the United States, prohibiting unreasonable search and seizure.

Nevertheless, the court in the *Winston Case* went on to declare that the reasonableness of surgical intrusions beneath the skin depends on a case-by-case approach, in which the individual's interests in privacy and security are weighed against society's interests in conducting the procedure. In a given case, the court said, the question whether the community's need for evidence outweighs the substantial privacy interests at stake is a delicate one admitting of few categorical answers. To aid in answering that question, the court suggested that the relevant constitutional standards would be those set forth in the earlier Supreme Court case of *Schmerber v California* (1966) 384 US 757, 16 L Ed 908, 86 S Ct 1826. In that case, the Supreme Court held that the Fourth Amendment privilege against unreasonable search or seizure was not violated by the taking of a blood sample, over protest, from a man hospitalized and under arrest for drunken driving as the result of an accident occurring when he lost control of his automobile. Noting that the Fourth Amendment privilege was not absolute, as was the Fifth Amendment privilege against self-incrimination, the court declared that the search-and-seizure privilege therein contained depended upon the "reasonableness" of the search or seizure in question. Observing the great importance of informed, detached, and deliberate determinations of the issue whether or not to invade another's body in search of evidence of guilt, the court proceeded to balance the individual's privacy rights against society's need for the evidence in question. Noting that for most people a blood test involves virtually no risk, trauma, or pain, so that the physical intrusion itself is slight, the court further observed that the blood test procedure has become routine in everyday life, being commonly done by consent for numerous purposes. The court contrasted this relatively minor physical intrusion with the community's interest in obtaining the sample. The court noted that a blood test is a highly effective means of determining the degree to which a person is under the influence of alcohol, and that there was a clear indication that in fact the desired evidence would be found if the blood test were undertaken. The court noted especially the difficulty of proving drunkenness by other means in its conclusion that results of the blood test in question would be of vital importance if the state were to enforce its drunken driving laws. Holding that, under the circumstances presented, the search and seizure of the defendant's blood to prove an unlawful alcohol concentration was reasonable, the court nevertheless cautioned that in the absence of a "clear indication" that in fact such needed evidence would be found, fundamental human interests in dignity and privacy would require law officers to suffer the risk of loss of evidence rather than carry a search beyond the body's surface. The court also stressed that its holding that the Constitution permits minor intrusions into an individual's body under stringently limited conditions in no way indicated permission for more substantial intrusions, or intrusions under other conditions.

On the other hand, the Supreme Court's attitude toward bodily intrusions for the purpose of search and seizure is also illustrated by the case of *Rochin v California* (1952) 342 US 165, 96 L

Ed 183, 72 S Ct 205, 25 ALR2d 1396, in which an individual, expecting imminent arrest, swallowed two narcotic capsules as he was approached by law enforcement officers. In order to remove the capsules, the suspect's stomach was pumped against his will in a hospital, a procedure characterized by the Supreme Court as offensive even to "hardened sensibilities," and "too close to the rack and the screw" to be constitutionally permissible. Although this procedure was not technically "surgical" in that there was no cutting of tissues, it would appear that it constituted, in the court's view, an impermissible "major intrusion" into the privacy and sanctity of the human body."

Admissibility and Weight of Blood Test Results in Immigration Preference or Derivative Citizenship Proceedings Under Immigration and Nationality Act (8 U.S.C.A. SS 1101 et seq.), 46 A.L.R. Fed. 176

"This annotation collects and analyzes the federal court cases and representative decisions of the Board of Immigration Appeals of the Immigration and Naturalization Service which have considered the admissibility of, and evidentiary weight to be accorded to, results of blood-grouping tests in immigration preference proceedings or derivative citizenship proceedings brought under the Immigration and Nationality Act (8 U.S.C.A. SS 1101 et seq.). The annotation includes all cases in which blood relationship is relevant on an immigration or nationality issue, whatever statutory provision may be the immediate basis of the case.

Since the annotation is limited to issues concerning the admissibility and weight of test results already obtained, it will not involve such matters as when tests may be ordered or what persons are subject to such order, or the effect of a refusal to submit to such tests, except insofar as these issues might relate directly to admissibility or weight of extant test results."

Authentication of Blood Sample Taken From Human Body for Purposes Other Than Determining Blood Alcohol Content, 77 A.L.R.5th 201

"When a blood specimen has been drawn for purposes of scientific analysis other than the determination of the blood's alcohol content, the proponent of the blood evidence ordinarily attempts to authenticate the sample tested by proving a chain of custody. This requires accounting for the sample's handling from the time it was first collected until the time it was analyzed. Unless the sample can be authenticated by other means, failure to make this accounting renders inadmissible the sample and any results of analysis of the sample. For example, in *Rabovsky v. Com.*, 973 S.W.2d 6, 77 A.L.R.5th 711 (Ky. 1998), where blood samples were collected in a hospital from the victim of an alleged intentional insulin overdose, transferred to a local laboratory, and finally transferred to a laboratory in another state, where the samples were tested for insulin levels, the results of the blood tests were inadmissible because no evidence was introduced to prove who collected the blood samples, how they were stored, how they were transported, or what method was used to test the samples. This annotation collects and analyzes cases that, in passing on either the admissibility of a blood specimen collected for purposes of scientific analysis other than determination of the blood's alcohol content, or the admissibility of the results of the analysis, have considered the sufficiency of the authentication of the specimen."

Authentication of Organic Nonblood Specimen Taken from Human Body for Purposes of Analysis, 78 A.L.R.5th 1

"When organic nonblood specimens are removed from a human body for scientific analysis the proponent must authenticate the specimen by showing that the specimen subjected to testing is the same specimen collected from the person in question. This is usually accomplished by proving a chain of custody, which requires accounting for the sample's handling from the time it was first collected until the time it was analyzed. For example, in *Akin v. State*, 698 So. 2d 228,

78 A.L.R.5th 607 (Ala. Crim. App. 1996), reh'g denied, (Jan. 17, 1997), the state established that the victim's body was autopsied by a pathologist, the body was taken to a funeral home, and the body was then returned to the coroner's office for a second autopsy. The medical examiner who performed the second autopsy, and whose analysis the defendant sought to exclude, re-autopsied the victim's partially dissected organs. Since there were some variations in the weight of the organs between the two autopsy reports, the defendant argued that it was not certain that the organs the medical examiner tested were the victim's. Rejecting this argument, the court emphasized that the record revealed no evidence that the body had been tampered with in any way. This annotation collects and analyzes cases which, in determining either the admissibility of an organic nonblood specimen collected for purposes of scientific analysis, or the admissibility of the results of such an analysis, have considered the sufficiency of the authentication of the specimen."

Liability for Conversion and Misappropriation of Genetic Material, 121 A.L.R.5th 315

"Human genetic information is being utilized with increasing frequency in various forms of scientific research. Consequently, significant questions have arisen regarding conditions under which researchers and other entities may obtain and use genetic information. One theory that has been advanced as a basis of liability for the unauthorized possession or use of genetic material is the tort theory of trover or conversion. Another theory of liability is that of misappropriation of trade secrets with respect to a particular genetic sequence or code or the raw cellular material from which it is derived. . . . This annotation collects and summarizes those cases in which courts have determined the issue of liability for conversion or misappropriation of genetic material."

Propriety of Search Involving Removal of Natural Substance or Foreign Object From Body by Actual or Threatened Force, 66 A.L.R. Fed. 119

"This annotation collects and analyzes the federal cases in which the court has discussed or decided whether, or under what circumstances, a search involving the removal of a natural substance or foreign object from the body, or from an artificial bodily appendage, by actual or threatened force, is proper. As used in this annotation, the term "force or threatened force," refers to all nonconsensual searches, including not only those searches conducted through use or threat of physical coercion, but also those conducted pursuant to warrant, court order, or military order. Outside the scope of this annotation are cases involving mere visual body searches, such as routine strip searches of prison inmates, routine border strip searches, and fluoroscope or x-ray searches in which there is no actual removal of any substance or object from the body."

Qualification as Expert to Testify as to Findings or Results of Scientific Test Concerning DNA Matching, 38 A.L.R.6th 439

"DNA identification evidence, expressly or impliedly including statistical calculations of band pattern frequency in the population, is ordinarily admissible to aid in determining a perpetrator's identity, on grounds that the technique has been scientifically accepted as reliable, or that the proof is at least as probative as prejudicial. The issue arises as to whether a witness is qualified to testify as to "DNA matching" and similar matters related to DNA science. In a rape prosecution, the trial court properly qualified a prosecution's DNA expert witness, after determining that the witness, who was employed by the Colorado Bureau of Investigation, had specialized education, experience, and training in DNA testing, specifically in the polymerase chain reaction/short tandem repeat (PCR/STR) process used for analyzing DNA, and giving considerable weight to the expert's practical experience with, and training in, PCR/STR DNA analysis, the court held in *People v. Lehmkuhl*, 117 P.3d 98, 38 A.L.R.6th 743 (Colo. Ct. App. 2004), cert. denied, 546 U.S. 1109, 126 S. Ct. 1064, 163 L. Ed. 2d 888 (2006). This annotation collects and addresses the cases that have considered whether a witness was qualified to testify

as to DNA matching."

Requiring Submission to Physical Examination or Test as Violation of Constitutional Rights, 25 A.L.R.2d 1407

"This annotation collects the cases, decided since the original publication in 164 A.L.R. 967, dealing with the problem whether constitutional rights and privileges are invaded by compelling submission to a compulsory physical examination or test. As pointed out in the original discussion, a number of the particular situations falling within the general problem under discussion, and several closely related problems, have received extensive treatment in separate annotations. In addition to annotations cited at 164 A.L.R. 968, see the following later annotations: Requiring defendant in criminal case to exhibit self, or perform physical acts, during trial and in presence of jury, 171 A.L.R. 1144. Admissibility of evidence of party's refusal to permit examination or inspection of property or person, 175 A.L.R. 234. Requiring suspect or defendant in criminal case to demonstrate voice for purposes of identification as denial of due process of law, 16 A.L.R.2d 1322. Pretrial requirement that suspect or accused wear or try on particular apparel as violating constitutional rights, 18 A.L.R.2d 796. Physiological or psychological truth and deception tests, 23 A.L.R.2d 1306. Like the earlier treatment, the present annotation excludes the problem of the admissibility of photographs of the accused offered as evidence of identity or physical condition."

Searches and Seizures: Reasonable Expectation of Privacy in Contents of Garbage or Trash Receptacle, 62 A.L.R.5th 1

"Courts have frequently confronted the question whether warrantless searches and seizures of one's garbage offends either the Fourth Amendment of the United States Constitution or parallel provisions in state constitutions. The vast majority of courts have ruled that when garbage is located in a place accessible to the public, the individual who placed that garbage for collection either abandoned it or has no reasonable expectation of privacy therein, thus rendering any search and seizure of that trash lawful. Consequently, significant factors in these cases include the precise location where the garbage was seized and special precautions taken to maintain privacy in the garbage. At least a few courts have ruled that one's expectation of privacy in garbage is reasonable, however, and that warrantless searches and seizures of such garbage, even if the garbage is left in a very public place, such as on the curb for pickup, violate the defendant's constitutional rights. For example, in *State v. Morris*, 680 A.2d 90, 62 A.L.R.5th 729 (Vt. 1996), where the defendant left secured, opaque trash bags on his curb for pickup, the court held that the state constitution protected the defendant's interest in the contents of his rubbish even though the Federal Constitution did not, reasoning that despite public accessibility to the trash, society was prepared to deem as reasonable an expectation that one's garbage is private, since it contains intimate details of one's life. This annotation collects and analyzes similar cases in which courts have analyzed the legality of warrantless searches and seizures of garbage under federal and state constitutions."

Validity, Construction, and Application of DNA Analysis Backlog Elimination Act of 2000, 42 U.S.C.A. SS 14135 et seq. and 10 U.S.C.A. S 1565, 187 A.L.R. Fed. 373

"The DNA Analysis Backlog Elimination Act of 2000, 42 U.S.C.A. SS 14135 et seq. and 10 U.S.C.A. S 1565, authorizes grants to eligible states to carry out DNA analyses of samples taken from individuals convicted of a qualifying state offense and samples taken from crime scenes for inclusion in the Combined DNA Index System (CODIS) of the Federal Bureau of Investigation and provides for the collection and use of DNA identification information from certain federal and District of Columbia offenders. . . . This annotation collects and analyzes cases which have discussed the validity, construction, and application of the DNA Analysis Backlog Elimination Act of 2000, 42 U.S.C.A. SS 14135 et seq. and 10 U.S.C.A. S 1565."

Validity, Construction, and Operation of State DNA Database Statutes, 76 A.L.R.5th 239

"Every state has enacted a statute creating a DNA (deoxyribonucleic acid) database for use in solving various classes of crimes. While these statutes have frequently been challenged, the challenges usually have been unsuccessful. For example, in *Landry v. Attorney General*, 429 Mass. 336, 709 N.E.2d 1085, 76 A.L.R.5th 703 (1999), petition for cert. filed, 68 U.S.L.W. 3153 (U.S. Aug. 20, 1999), the court held that the state's DNA database statute did not authorize an unreasonable search and seizure in violation of the Fourth Amendment and its state constitutional analogue, and that it was not necessary, before the statute went into effect, to promulgate specific regulations, spelling out when and how reasonable force could be used to acquire DNA samples from nonconsenting persons. This annotation collects and analyzes state and federal cases discussing the validity, construction, and operation of state statutes creating or regulating DNA databases created for the purpose of enforcing the criminal law, and the regulations implementing such statutes."

BIBLIOGRAPHIES AND CURRENT AWARENESS

CODIS—NDIS Statistics (<http://www.fbi.gov/about-us/lab/biometric-analysis/codis/ndis-statistics>) (FBI)
"Measuring Success: The National DNA Index (NDIS) contains over 10,420,100 offender profiles, 1,546,700 arrestee profiles and 498,600 forensic profiles as of June 2013. Ultimately, the success of the CODIS program will be measured by the crimes it helps to solve. CODIS's primary metric, the "Investigation Aided," tracks the number of criminal investigations where CODIS has added value to the investigative process. As of June 2013, CODIS has produced over 213,100 hits assisting in more than 204,200 investigations."

Constitutionality of DNA Collection Before Conviction: An Updated Scorecard

(<http://www.personal.psu.edu/dhk3/blogs/DoubleHelixLaw/2013/03/the-constitutionality-of-dna-collection-before-conviction-an-updated-scorecard-2.html>) , Double Helix, March 30, 2013

"Fifteen years ago, Louisiana adopted a law mandating that "[a] person who is arrested for a felony sex offense or other specified offense . . . shall have a DNA sample drawn or taken at the same time he is fingerprinted pursuant to the booking procedure." As of mid-2012, 28 states and the federal government had laws providing for DNA sampling before any conviction is obtained. Most other countries with DNA databases also collect samples on arrest. These laws have provoked conflicting constitutional opinions. The Supreme Court heard argument in *Maryland v. King* in February 2013 and is likely to rule on the issue in June 2013. For a scoreboard on the litigation and a list of scholarly commentary to date, see <http://for-sci-law-now.blogspot.com/2013/03/the-constitutionality-of-dna-collection.html> (<http://for-sci-law-now.blogspot.com/2013/03/the-constitutionality-of-dna-collection.html>) ."

DNA Bibliography (<http://www.ncstl.org/search/shared>

[/861160BB7640990E0471835D24C13774?category=4&page=1](http://www.ncstl.org/search/shared/861160BB7640990E0471835D24C13774?category=4&page=1)) (NCSTL 2013)

This is a compilation of current research on the legal and forensic applications of DNA.

DNA Collection Upon Arrest (<http://www.ncstl.org/resources/DNACollectionUponArrest>) (NCSTL 2011)

"A new wave of legislation is sweeping across the nation with nearly half of the states currently requiring the pretrial collection of DNA samples from individuals who are arrested for various crimes but not yet convicted. Collected DNA samples are submitted to the Combined DNA Index System ("CODIS") and are compared against other DNA profiles in CODIS. The states listed below have enacted laws requiring arrestees to submit DNA samples. However, the laws are not uniform among the states. Several states, including Maryland and Tennessee require a probable cause hearing prior to the DNA being loaded into a DNA database. Some states, such as Alabama, California, and Florida require DNA samples to be submitted if an individual is arrested

for committing any felony offense. Other states, including Arizona, Maryland, and New Mexico require DNA samples to be submitted only in cases where an individual is arrested for a violent felony such as murder or sexual assault. Additionally, state laws vary whether juveniles must submit DNA samples upon arrest. Florida, Kansas, Louisiana, and South Carolina specifically include juveniles while other states do not. The relevant federal statutes are also listed below."

[DNA Evidence](http://topics.nytimes.com/top/reference/timestopics/subjects/d/dna_evidence/index.html) (http://topics.nytimes.com/top/reference/timestopics/subjects/d/dna_evidence/index.html) (NY Times)

This is an updated list of articles published in the NY Times concerning DNA research, testing and legal issues.

[DNA Evidence Basics](http://www.nij.gov/nij/topics/forensics/evidence/dna/basics/welcome.htm) (<http://www.nij.gov/nij/topics/forensics/evidence/dna/basics/welcome.htm>) (NIJ)

"DNA collection and analysis gives the criminal justice field a powerful tool for convicting the guilty and exonerating the innocent. About Forensic DNA provides general information on a wide range of topics. . . . Learn about: * Basics of Identifying, Gathering and Transporting DNA Evidence * Basics of Analyzing DNA Evidence * Possible Results from a DNA Test * Types of Samples Suitable for DNA Testing"

[DNA for Defense](http://www.ncstl.org/education/DNA%20for%20Defense) (<http://www.ncstl.org/education/DNA%20for%20Defense>) (NCSTL)

Extensive bibliography of materials on DNA's scientific and legal implications for presenting a defense in criminal cases.

[DNA Sample Collection from Arrestees](http://nij.gov/topics/forensics/evidence/dna/collection-from-arrestees.htm) (<http://nij.gov/topics/forensics/evidence/dna/collection-from-arrestees.htm>) (NIJ)

"On this page find: * Overview of Arrestee DNA Collection Laws * Logistical Issues * Implementation Challenges"

[Double Helix Law](http://www.personal.psu.edu/dhk3/blogs/DoubleHelixLaw/2013/03/the-constitutionality-of-dna-collection-before-conviction-an-updated-scorecard-2.html) (<http://www.personal.psu.edu/dhk3/blogs/DoubleHelixLaw/2013/03/the-constitutionality-of-dna-collection-before-conviction-an-updated-scorecard-2.html>) (Prof. David H. Kaye (http://law.psu.edu/faculty/resident_faculty/kayea), Distinguished Professor of Law, Weiss Family Faculty Scholar, The Dickinson School of Law)

"This blog examines developments in the law of evidence and forensic genetics. In addition to pursuing the evidentiary issues addressed in the book, [The Double Helix and the Law of Evidence](http://www.hup.harvard.edu/catalog.php?isbn=9780674035881) (<http://www.hup.harvard.edu/catalog.php?isbn=9780674035881>), it comments on threats -- perceived and real -- to privacy and civil liberties posed by developments such as law-enforcement DNA databases. The latter set of issues are the subject of a forthcoming book, *DNA Identification and the Threat to Civil Liberties*."

[Forensic DNA](http://www.nij.gov/topics/forensics/evidence/dna/welcome.htm) (<http://www.nij.gov/topics/forensics/evidence/dna/welcome.htm>) (NIJ)

"Forensic DNA analysis has played a crucial role in the investigation and resolution of thousands of crimes since the late 1980s. The demand for tools and technologies in all areas of forensic science, including DNA testing, far exceed the current capabilities of the field. To help meet that demand, the NIJ has funded forensic DNA research and development projects for over a decade."

[Forensic DNA: Miniaturization and Automation](http://www.nij.gov/topics/forensics/evidence/dna/research/miniaturization-automation.htm) (<http://www.nij.gov/topics/forensics/evidence/dna/research/miniaturization-automation.htm>) (NIJ)

"On this page find: * Description * Research Projects * Journal Articles and Publications
Description New technologies are being developed to miniaturize DNA testing instruments and to improve automation of the processes involved. Both miniaturization and automation have the potential to improve the speed and to reduce the cost of DNA analysis. In addition, miniaturizing

the instrumentation required to perform DNA testing could enable examination of biological samples at the crime scene if desired in the future here in the United States."

[Forensic DNA: Research and Development \(http://www.nij.gov/nij/topics/forensics/evidence/dna/research/welcome.htm\)](http://www.nij.gov/nij/topics/forensics/evidence/dna/research/welcome.htm) (NIJ)

"Forensic DNA analysis has played a crucial role in the investigation and resolution of crimes and missing persons cases since the late 1980s. The demand for tools and technologies in all areas of forensic science, including DNA testing, far exceed the current capabilities of the field. To help meet that demand, the NIJ has funded forensic DNA research and development projects for over a decade. Select an area of research to learn more: * Alternative Genetic Markers * Compromised DNA Evidence * Human DNA Quantitation * General Tools and Information * Miniaturization and Automation * Mitochondrial DNA * Non-Human DNA * Sperm Detection and Separation * Y Chromosome."

[Forensic DNA: Topical Collection \(http://nij.ncjrs.gov/App/publications/Pub_search.aspx?searchtype=basic&category=%2E%2E%2Easic&location=top&PSID=37\)](http://nij.ncjrs.gov/App/publications/Pub_search.aspx?searchtype=basic&category=%2E%2E%2Easic&location=top&PSID=37) (NIJ)

This is an updated collection of NIJ or NIJ sponsored publications regarding forensic DNA applications and studies.

[Forensic Magazine: Topic DNA \(http://www.forensicmag.com/topics/dna\)](http://www.forensicmag.com/topics/dna)

This is a collection of current news article summaries about developments in DNA Analysis, Collection, Crime Lab Backlog and DNA Sample Prep.

[Forensic Investigation \(http://www.bjs.gov/index.cfm?ty=tp&tid=78\)](http://www.bjs.gov/index.cfm?ty=tp&tid=78) (BJS)

"Forensic science can be simply defined as the application of science to the law. In criminal cases forensic scientists are often involved in the search for and examination of physical traces, which might be useful for establishing or excluding an association between someone suspected of committing a crime and the scene of the crime or victim. DNA evidence has become an increasingly powerful tool for solving both violent crimes and property crimes, such as homicide, sexual assault, and burglaries.

Forensic crime laboratories are responsible for examining and reporting on physical evidence collected during criminal investigations for federal, state, and local jurisdictions. The nation's forensic crime laboratories receive requests for a variety of forensic services, such as DNA analysis, controlled substance identification, and latent fingerprint examination. DNA evidence collected from a crime scene can implicate or eliminate a suspect, similar to the use of fingerprints. It also can analyze unidentified remains through comparisons with DNA from relatives. Additionally, when evidence from one crime scene is compared with evidence from another using Combined DNA Index System (CODIS), those crime scenes can be linked to the same perpetrator locally, statewide, and nationally."

[Identifying Missing Persons and Unidentified Decedents \(http://www.nij.gov/topics/forensics/investigations/missing-persons/welcome.htm\)](http://www.nij.gov/topics/forensics/investigations/missing-persons/welcome.htm) (NIJ)

"On this page find: * Missing Persons Cases * Unidentified Decedents and Unclaimed Persons * Identification in Mass Fatality Incidents."

[National Commission on the Future of DNA Evidence \(http://www.nij.gov/topics/forensics/evidence/dna/commission/welcome.html\)](http://www.nij.gov/topics/forensics/evidence/dna/commission/welcome.html) (NIJ 1998-2000)

"Archival notice: This is an archive page that is no longer being updated. It may contain outdated information and links may no longer function. The National Commission on the Future of DNA Evidence was established by the Attorney General to maximize the value of forensic DNA evidence in the criminal justice system. On this page find: * Overview * Meeting Transcripts *

Publications & Training * Members Overview of the DNA Commission After reading *Convicted by Juries, Exonerated by Science: Case Studies in the Use of DNA Evidence to Establish Innocence After Trial*, the Attorney General directed the National Institute of Justice to establish and administer a commission. The purpose of the National Commission on the Future of DNA Evidence was to provide the Attorney General with recommendations on the use of current and future DNA methods, applications and technologies in the operation of the criminal justice system, from the crime scene to the courtroom. The Commission held its first meeting on March 18, 1998.

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1 (features/dnaevidence.htm#_ftnref1) See, e.g., [Computerised Fingerprint Grading Could Increase Forensic Accuracy](http://www.theengineer.co.uk/military-and-defence/news/computerised-fingerprint-grading-could-increase-forensic-accuracy/1016644.article) (<http://www.theengineer.co.uk/military-and-defence/news/computerised-fingerprint-grading-could-increase-forensic-accuracy/1016644.article>), *The Engineer*, July 4, 2013; [Eye on Crime: The FBI Is Building a Database of Iris Scans](http://www.nextgov.com/emerging-tech/2012/06/eye-crime-fbi-building-database-iris-scans/56481/) (<http://www.nextgov.com/emerging-tech/2012/06/eye-crime-fbi-building-database-iris-scans/56481/>), NextGov, June 27, 2012. See generally Robin Bowen and Jessica Schneider, [Forensic Databases: Paint, Shoe Prints, and Beyond](http://www.nij.gov/journals/258/forensic-databases.html) (<http://www.nij.gov/journals/258/forensic-databases.html>), NIJ Journal, No. 258, Oct. 2007. See generally Ken Strutin, [Databases, E-Discovery and Criminal Law](http://ssrn.com/abstract=1789845) (<http://ssrn.com/abstract=1789845>), 15 Rich. J.L. & Tech. 6 (2009).

2 (features/dnaevidence.htm#_ftnref2) This article does not consider post-conviction DNA collection or exculpatory testing issues. See generally Chp 11 [Using Post-Conviction DNA Testing to Attack Your Conviction or Sentence](http://www3.law.columbia.edu/hrlr/jlm/chapter-11.pdf) (<http://www3.law.columbia.edu/hrlr/jlm/chapter-11.pdf>) in *A Jailhouse Lawyer's Manual* (9th ed. 2011); [Postconviction Testing and Wrongful Convictions](http://www.nij.gov/nij/topics/forensics/postconviction/welcome.htm) (<http://www.nij.gov/nij/topics/forensics/postconviction/welcome.htm>) (NIJ 2012); [DNA Evidence as Newly Discovered Evidence Which Will Warrant Grant of New Trial or Other Postconviction Relief in Criminal Case](#), 125 A.L.R.5th 49; [Validity, Construction, and Application of State Statutes and Rules Governing Requests for Postconviction DNA Testing](#), 72 A.L.R.6th 227.

3 (features/dnaevidence.htm#_ftnref3) See also Ken Strutin, [Passwords and the Fifth Amendment](http://www.newyorklawjournal.com/PubArticleNY.jsp?id=900005505471&Passwords_and_the_Fifth_Amendment) (http://www.newyorklawjournal.com/PubArticleNY.jsp?id=900005505471&Passwords_and_the_Fifth_Amendment), N.Y.L.J., Mar. 11, 2008, at 5.

4 (features/dnaevidence.htm#_ftnref4) See [Integrated Encyclopedia of DNA Elements in the Human Genome](http://www.nature.com/nature/journal/v489/n7414/full/nature11247.html) (<http://www.nature.com/nature/journal/v489/n7414/full/nature11247.html>), *Nature*, Sept. 5, 2012, at 57.

5 (features/dnaevidence.htm#_ftnref5) See also Henry K. Lee, [How Innocent Man's DNA Was Found at Killing Scene](http://www.sfgate.com/default/article/How-innocent-man-s-DNA-was-found-at-killing-scene-4624971.php) (<http://www.sfgate.com/default/article/How-innocent-man-s-DNA-was-found-at-killing-scene-4624971.php>), SFGate, Aug. 2, 2013; Osagie K. Obasogie, [High-Tech, High-Risk Forensics](http://www.nytimes.com/2013/07/25/opinion/high-tech-high-risk-forensics.html?emc=eta1&_r=1&) (http://www.nytimes.com/2013/07/25/opinion/high-tech-high-risk-forensics.html?emc=eta1&_r=1&), N.Y. Times, July 25, 2013, at A27.

6 (features/dnaevidence.htm#_ftnref6) See generally Ken Strutin, [Presenting Real Evidence Captured in the Digital World](http://www.law.com/jsp/lawtechnologynews/PubArticleLTN.jsp?id=1202508908525&Presenting_Real_Evidence_Captured_in_the_Digital_World) (http://www.law.com/jsp/lawtechnologynews/PubArticleLTN.jsp?id=1202508908525&Presenting_Real_Evidence_Captured_in_the_Digital_World), N.Y.L.J., July 29, 2011, at 5 (print edition: Ken Strutin, [Real, Demonstrative Evidence From the Digital World](#), N.Y.L.J., July 26, 2011, at 5).

7 (features/dnaevidence.htm#_ftnref7) See also [Miss. Law Requires Cord Blood from Some Teen Moms](http://bigstory.ap.org/article/miss-law-requires-cord-blood-some-teen-moms) (<http://bigstory.ap.org/article/miss-law-requires-cord-blood-some-teen-moms>), AP, Aug. 2, 2013.

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