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Flawed Forensics and the Death Penalty: Junk Science and Potentially Wrongful Executions

Jessica Dwyer-Moss*

In April 2012, the *Washington Post* ran a story announcing that the Department of Justice (DOJ) knew that flawed forensic science had potentially led to the convictions of innocent people and for years did nothing to either investigate defendants' possible innocence or to inform the defendants in question that the evidence used to convict them had been severely undermined.¹ A nine-year Federal Bureau of Investigation (FBI) review of suspect cases involving hair comparisons concluded in 2004; however, the DOJ never told the prisoners whose cases showed anomalies that the evidence no longer demonstrated their guilt.² The scandal sparked public outcry and an increased emphasis on the fallibility of commonly accepted forensic techniques. Eventually the DOJ agreed to review thousands of cases involving microscopic hair analysis, some dating back as far as 1985.³ This number is staggering—not dozens, not hundreds, but thousands of people may have been convicted on the basis of flawed

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¹ Spencer S. Hsu, *Convicted Defendants Left Uninformed of Forensic Flaws Found by Justice Dept.*, WASH. POST, Apr. 16, 2012, http://www.washingtonpost.com/local/crime/convicted-defendants-left-uninformed-of-forensic-flaws-found-by-justice-dept/2012/04/16/gIQAWTcgMT_story.html.

² *Id.*

³ Spencer S. Hsu, *Justice Dept., FBI to Review Use of Forensic Evidence in Thousands of Cases*, WASH. POST, July 10, 2012, http://www.washingtonpost.com/local/crime/justice-dept-fbi-to-review-use-of-forensic-evidence-in-thousands-of-cases/2012/07/10/gJQAT6DlbW_story.html [hereinafter Hsu, *Forensic Evidence*].

microscopic hair analysis. And this is just one of many widely used forensic techniques. One must question how this is possible.

The term “forensic science” is something of a misnomer. In many cases, it is little more than guesswork. Precious little forensic science is supported by scientific data.⁴ Ballistics, fingerprints, shoe prints, teeth indentations—none of these widely accepted forensic methodologies have been demonstrated to be scientifically dependable.⁵ Despite their suspect reliability, these and other forensic technologies are often used as evidence in criminal cases. How can this be? The implications are startling, particularly in murder cases. If our trust in forensics is misplaced, and convictions are overturned as a result of this FBI review, what does this mean for defendants in capital cases?

The scandal at the DOJ comes at a time when the nation is grappling more than ever before with the realities of the death penalty. In September 2011, about six months before the DOJ story broke, the state of Georgia executed a man named Troy Davis. His many supporters—including hundreds of thousands of people who signed petitions on his behalf, a former director of the FBI, Pope Benedict XVI, and former president Jimmy Carter—urged Georgia to reconsider Davis’s sentence, arguing that there was too much doubt about his guilt.⁶ Davis was convicted largely on the basis of eyewitness testimony,⁷ but over the course of the twenty years between his trial and his execution, seven of the nine witnesses who

⁴ See, e.g., David L. Faigman, *Anecdotal Forensics, Phrenology, and Other Abject Lessons from the History of Science*, 59 HASTINGS L.J. 979, 998–99 (2008).

⁵ *Id.* at 992.

⁶ Elizabeth Flock, *Troy Davis Execution Sparks Anti-Death Penalty Backlash, Protests*, WASH. POST, Sept. 22, 2011, http://www.washingtonpost.com/national/troy-davis-execution-sparks-anti-death-penalty-backlash-protests/2011/09/22/gIQAQawOoK_story.html.

⁷ Ballistics evidence, which was later thrown out, was also used during Davis’s trial, but because of the importance of witness testimony to his conviction, this paper will not explore this evidence.

testified against him had recanted their testimony.⁸ In sworn affidavits, witnesses wrote that they had felt pressured by police into implicating Davis or, in some cases, had not actually read their original statements before signing them.⁹

Despite the great uncertainty surrounding Davis's guilt, the Georgia State Board of Pardons and Parole denied Davis clemency,¹⁰ and the US Supreme Court denied a last-minute stay of execution.¹¹ Davis's death is a seminal moment in modern discussions of capital punishment. As President Carter said shortly after Davis's death, "if one of our fellow citizens can be executed with so much doubt surrounding his guilt, then the death penalty system in our country is unjust and outdated."¹²

Davis's story, while not the topic of this article, is important to keep in mind. Any discussion of the death penalty would be incomplete without acknowledging the significance of his case to current national discourse on the topic. His death has mobilized death penalty abolitionists and sparked a difficult examination of the state of capital punishment today. Davis's death forces us to confront an inescapable question: Is it possible that innocent people have been executed for crimes they did not commit?

⁸ Andy Coghlan, *Troy Davis Execution Highlights Witness Unreliability*, NEWSIDENTIST (Sept. 22, 2011), <http://www.newscientist.com/article/dn20956-troy-davis-execution-highlights-witness-unreliability.html>.

⁹ See USA: 'Where is the Justice for Me?': The Case of Troy Davis, Facing Execution in Georgia, AMNESTY INT'L (Feb. 1, 2007), <http://www.amnestyusa.org/research/reports/usa-%E2%80%98where-is-the-justice-for-me-the-case-of-troy-davis-facing-execution-in-georgia?page=show>.

¹⁰ Kim Severson, *Georgia Pardons Board Denies Clemency for Death Row Inmate*, N.Y. TIMES, Sept. 20, 2011, http://www.nytimes.com/2011/09/21/us/troy-davis-is-denied-clemency-in-georgia.html?_r=2&ref=us.

¹¹ Flock, *supra* note 6.

¹² Elizabeth Flock, *Cameron Todd Willingham, Others on Death Row Remembered as Troy Davis is Executed*, WASH. POST, Sept. 22, 2011, http://www.washingtonpost.com/blogs/blogpost/post/cameron-todd-willingham-others-on-death-row-remembered-as-troy-davis-is-executed/2011/09/22/gIQA7VKpnK_blog.html.

The answer, unfortunately, is yes. Since 1973, over 140 defendants sentenced to death either had their convictions overturned or were granted full pardons on the basis of new evidence.¹³ DNA evidence played a substantial role in eighteen of those cases.¹⁴ While no person executed under modern death penalty procedures¹⁵ has been posthumously exonerated,¹⁶ several recent cases demonstrate, at the very least, a strong possibility that a number of innocent men have been put to death for crimes they did not commit.¹⁷ But not all of those cases were built upon a shaky foundation of eyewitness testimony, evidence that has been repeatedly

¹³ *The Innocence List*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/innocence-list-those-freed-death-row> (last visited Feb. 10, 2013).

¹⁴ *Id.* DNA evidence is only available in a small portion of crimes, which explains why the number of DNA-based exonerations is so low. See Myrna S. Raeder, *Post-Conviction Claims of Innocence*, 24 CRIM. JUST. 3 (2009), available at http://www.americanbar.org/content/dam/aba/publishing/criminal_justice_section_newsletter/crimjust_cjmag_24_3_raeder.authcheckdam.pdf.

¹⁵ I use “modern death penalty procedures” to refer to procedures that were instituted as a result of the reinstatement of the death penalty following *Furman v. Georgia*, 408 U.S. 238 (1972). A brief history of the modern death penalty follows shortly.

¹⁶ There are, however, cases of posthumous pardons. In 2011, the governor of Colorado pardoned Joe Arridy, who was executed in 1939. See Press Release, Governor Bill Ritter, Jr., Governor Ritter Grants Posthumous Pardon in Case Dating Back to 1930s (Jan. 7, 2011), available at <http://www.deathpenaltyinfo.org/documents/ArridyPardon.pdf>; see also *Colorado Governor Grants Unconditional Pardon Based on Innocence to Inmate Who Was Executed*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/colorado-governor-grants-unconditional-pardon-based-innocence-inmate-who-was-executed> (last visited Oct. 12, 2012); see also *Executed but Possibly Innocent*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/executed-possibly-innocent> (last visited Feb. 12, 2013) (naming, in addition to Joe Arridy, Thomas Griffin, Meeks Griffin, and Lena Baker as executed individuals who were formally pardoned). All of these cases, however, involve crimes committed before the imposition of modern death penalty procedures in 1976. *Id.*

¹⁷ Eleven, including Troy Davis. See *Executed but Possibly Innocent*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/executed-possibly-innocent> (last visited Oct. 12, 2012). By another count, the number is nineteen, including Troy Davis. See *Wrongful Executions*, CTR. ON WRONGFUL CONVICTIONS, <http://www.law.northwestern.edu/wrongfulconvictions/issues/wrongfulexecutions/> (last visited Feb. 8, 2013).

proven to be unreliable.¹⁸ Some men¹⁹ with credible claims of innocence were convicted and executed on the basis of forensic science.²⁰

This article examines several of these cases and explores the strengths and weaknesses of various forensic techniques. Its scope is admittedly limited; an in-depth analysis of all defendants with credible claims of innocence executed on the basis of questionable forensic evidence (ranging from fingerprints to ballistics analysis, from fiber comparisons to shoe and tire tracks)²¹ is something better suited for a multi-volume treatise. Instead, I examine two deeply flawed areas of forensic science—arson investigation and hair analysis—in comparison to DNA profiling, and then consider a

¹⁸ See, e.g., *Manson v. Brathwaite*, 432 U.S. 98, 112 (1977). “Usually the witness must testify about an encounter with a total stranger under circumstances of emergency or emotional stress. The witnesses’ recollection of the stranger can be distorted easily by the circumstances or by later actions of the police.” *Id.*; *U.S. v. Wade*, 388 U.S. 218, 228 (1967).

The vagaries of eyewitness identification are well-known; the annals of criminal law are rife with instances of mistaken identification. Mr. Justice Frankfurter once said: ‘What is the worth of identification testimony even when uncontradicted? The identification of strangers is proverbially untrustworthy. The hazards of such testimony are established by a formidable number of instances in the records of English and American trials. These instances are recent—not due to the brutalities of ancient criminal procedure.’

Id. (quoting Felix Frankfurter, *The Case of Sacco and Vanzetti*, ATLANTIC, Mar. 1927, available at <http://www.theatlantic.com/magazine/archive/1927/03/the-case-of-sacco-and-vanzetti/306625/>)

¹⁹ Women are statistically very unlikely to receive the death penalty. While women constitute 10 percent of murder arrestees, they account for just 2.1 percent of death sentences imposed, and 0.9 percent of persons actually executed in the modern era. Victor Streib, *Death Penalty for Female Offenders, January 1, 1973, through December 31, 2011*, DEATH PENALTY INFO. CTR. 3 (2012), <http://www.deathpenaltyinfo.org/documents/FemDeathDec2011.pdf>. It is certainly possible that a female defendant was executed on the basis of flawed forensic science, but my research at this point has not yielded such an example.

²⁰ See *infra* Section III.

²¹ See NAT’L RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (2009), available at <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf> [hereinafter NAT’L RESEARCH COUNCIL, STRENGTHENING].

defendant convicted on the basis of such evidence who maintained a credible claim of innocence until his execution.

The first section explores some necessary background information regarding forensic science. I briefly examine the modern state of forensic science, a field riddled with documented inconsistencies and a troubling lack of national standards or certifications. Next, is a brief synopsis of the *Frye* and *Daubert* standards for expert witness testimony, which are the primary means of introducing novel scientific evidence into the courtroom.²²

The second section focuses entirely on the death penalty, providing a brief overview of capital punishment as a modern institution. Starting with *Furman v. Georgia*,²³ the landmark Supreme Court case that temporarily abolished capital punishment and ushered in a new era of death penalty procedures,²⁴ I explain the protections granted to capital defendants and how those protections have changed over time.

The third section discusses actual cases of potentially wrongful executions. Specifically, the section examines two deeply flawed forensic techniques: arson investigation and microscopic hair analysis. I explore the cases of Cameron Todd Willingham and Claude Jones, each of whom were convicted on the basis of questionable forensic evidence and maintained credible claims of innocence until they were executed. Next, I compare arson investigation and microscopic hair analysis to DNA profiling, exploring DNA profiling's reliability and shortcomings.

The final substantive section offers recommendations for a complete overhaul of current forensic techniques. I argue for regulation of forensic investigators and laboratories, increased education for attorneys and judges,

²² See A. Lustre, *Post-Daubert Standards for Admissibility in State Courts*, 90 A.L.R. 5th (2007).

²³ *Furman v. Georgia*, 408 U.S. 238 (1972).

²⁴ See, e.g., *Gregg v. Georgia*, 428 U.S. 153 (1976).

and abolition of the death penalty.

I. FORENSIC SCIENCE—MODERN JUNK?

The field of forensic science is plagued with problems. Some techniques, like DNA profiling, are scientifically reliable when performed correctly.²⁵ Experts testifying about DNA evidence during trials give “statistical statements adequately supported by data.”²⁶ DNA profiling, though, stands in stark contrast to other widely used forensic methodologies. “A large number of experts—in areas such as latent fingerprints, firearms identification, handwriting, bitemarks, and many others . . . have no such sound scientific footings.”²⁷ Indeed, as the National Academy of Sciences concluded in a 2009 report, “[w]ith the exception of nuclear DNA analysis, . . . no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.”²⁸

Unsubstantiated pseudo-scientific evidence has a lengthy history of admission in US courts, and courts have been slow to recognize and correct their decisions about the admissibility of novel forensic techniques. After thirty years of acceptance in courts, scientists demonstrated that the paraffin test for gunpowder residue was unreliable.²⁹ Pioneered in the 1930s, the test purportedly analyzed trace substances on a suspect’s hands to determine if he or she had recently fired a gun.³⁰ Eventually, evidence “demonstrate[ed]

²⁵ See, e.g., NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 130. “DNA typing is now universally recognized as the standard against which many other forensic individualization techniques are judged. DNA enjoys this preeminent position because of its reliability and the fact that, absent fraud or an error in labeling or handling, the probabilities of a false positive are quantifiable and often miniscule.” *Id.*

²⁶ Faigman, *supra* note 4, at 979.

²⁷ *Id.*

²⁸ NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 7.

²⁹ Andre A. Moenssens, *Admissibility of Scientific Evidence—An Alternative to the Frye Rule*, 25 WM. & MARY L. REV. 545, 553–55 (1984).

³⁰ *Id.*

that the test results were not only nonspecific for gunpowder residues, but that the likelihood that an accurate conclusion could be drawn from the test was less than fifty percent.”³¹

More recently, in 2005, the FBI abandoned compositional analysis of bullet lead³² as a scientific method³³ after the National Academy of Sciences concluded that expert witnesses often overstated the strength of the evidence.³⁴ The National Research Commission cautioned that this technology, which had allowed FBI agents to test bullet fragments too small or damaged for a traditional ballistics analysis for elemental similarities, could be unreliable.³⁵ The commission concluded that “[v]ariations among and within lead bullet manufacturers make any modeling of the general manufacturing process unreliable and potentially misleading in CABL comparisons.”³⁶ Some defendants convicted on the basis of comparative lead bullet analysis have since had their convictions overturned.³⁷ The downfall of bullet lead comparison suggests a troubling practice. In the words of Clifford Spiegelman, who served on the National Academy of Sciences panel that authored a highly critical report on comparative bullet analysis, the “FBI or other prosecution scientists are simply doing what it

³¹ *Id.* at 554.

³² See William C. Thompson, *Analyzing the Relevance and Admissibility of Bullet-Lead Evidence: Did the NRC Report Miss the Target?*, 46 JURIMETRICS J. 65 (2005).

³³ *FBI Laboratory Announces Discontinuation of Bullet Lead Examinations*, FBI (Sept. 1, 2005), <http://www.fbi.gov/news/pressrel/press-releases/fbi-laboratory-announces-discontinuation-of-bullet-lead-examinations>.

³⁴ See NAT’L RESEARCH COUNCIL, REPORT IN BRIEF, FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE (2004), available at http://dels-old.nas.edu/dels/rptbriefs/bullet_lead_final.pdf.

³⁵ NAT’L RESEARCH COUNCIL, FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE 112 (2004), available at http://www.nap.edu/openbook.php?record_id=10924&page=R1.

³⁶ *Id.*

³⁷ John Solomon, *A Murder Conviction Torn Apart by a Bullet*, WASH. POST, Nov. 19, 2007, <http://www.washingtonpost.com/wp-dyn/content/article/2007/11/18/AR2007111801539.html>.

takes to ‘get their man.’”³⁸

Modern forensic science is in a sorry state. The 2009 report by the National Academy of Sciences sharply criticized common forensic practices. The report recognized that “great disparities” exist among forensic science laboratories across the country.³⁹ Those disparities extend to “funding, access to analytical instrumentation, the availability of skilled and well-trained personnel, certification, accreditation, and oversight.”⁴⁰ Most jurisdictions do not require forensic technicians to be certified or crime laboratories to be accredited.⁴¹ The National Academy of Sciences cautioned that “[t]hese shortcomings obviously pose a continuing and serious threat to the quality and credibility of forensic science practice.”⁴² But even if all crime laboratories had to meet rigorous accreditation standards and every forensic technician was required to hold a graduate degree in the sciences, forensic science would still rest upon inadequate scientific foundations. “The simple reality is that the interpretation of forensic evidence is not always based on scientific studies to determine its validity. . . . [T]here is a notable dearth of peer-reviewed, published studies establishing the scientific bases and validity of many forensic methods.”⁴³ In short, a significant number of widely practiced forensic techniques have very little demonstrated scientific merit.⁴⁴

It is impossible to ignore the significant risk of erroneous convictions when DNA evidence has demonstrated that many inmates were actually

³⁸ *Id.*

³⁹ NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 5.

⁴⁰ *Id.*

⁴¹ *Id.* at 199.

⁴² *Id.* at 6.

⁴³ *Id.* at 8.

⁴⁴ Some non-DNA techniques, though, like microscopic hair analysis, do have some limited application. *Id.* They may not provide identification of a particular person, but they can be used to exclude certain individuals from the suspect pool. *See id.*

innocent of the crimes for which they were convicted.⁴⁵ According to the National Academy of Sciences, “[t]he number of exonerations resulting from the analysis of DNA has grown across the country in recent years, uncovering a disturbing number of wrongful convictions—some for capital crimes—and exposing serious limitations in some of the forensic science approaches commonly used in the United States.”⁴⁶

Even widely accepted, run-of-the-mill forensic techniques have been called into question. Fingerprints, for instance, have long been accepted in US courts.⁴⁷ But fingerprints have never been scientifically proven to be unique.⁴⁸ Fingerprint experts “use no probability models and have no probability data to use.”⁴⁹ Instead, they rely on “intuition and assumptions that have not been tested rigorously.”⁵⁰

What forensic evidence, then, *is* reliable? DNA profiling is quantitative rather than qualitative—analysts are able to demonstrate the probability that two samples are from the same person.⁵¹ This makes DNA evidence unique

⁴⁵ *Facts on Post-Conviction DNA Exonerations*, INNOCENCE PROJECT, http://www.innocenceproject.org/Content/Facts_on_PostConviction_DNA_Exonerations.php (last visited Feb. 8, 2013). Since 1989, there have been 302 post-conviction DNA exonerations in the United States. *Id.*

⁴⁶ NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 42.

⁴⁷ *See, e.g.*, *People v. Jennings*, 252 Ill. 534, 546 (1911). “While the courts of this country do not appear to have had occasion to pass on the question, standard authorities on scientific subjects discuss the use of finger prints as a system of identification, concluding that experience has shown it to be reliable.” *Id.*

⁴⁸ Michael J. Saks, *Merlin and Solomon: Lessons From the Law’s Formative Encounters with Forensic Identification Science*, 46 HASTINGS L.J. 1069, 1105–06 (1998).

⁴⁹ *Id.*

⁵⁰ *Id.* at 1106. *See also* NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 139 (explaining that “assessment of latent prints from crime scenes is based largely on human interpretation,” and that the outcome of a print analysis “is not necessarily repeatable from examiner to examiner”).

⁵¹ *See* NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 133 (explaining that DNA evidence is scientifically sound for several reasons: biological explanations for individual-specific findings; testing methods designed so that the chance of two different people matching on all thirteen loci are very small; testing regarding the probability of

in the forensic field. Fingerprint experts, for instance, do not testify that there is a one in three-hundred-thousand chance that someone other than the suspect left a particular fingerprint.⁵² In contrast, DNA experts can state the probability that two samples were left by two different people.⁵³ Without statistical data to support assertions, forensic science is little more than guesswork—many techniques amount to little more than a side-by-side visual comparison. It is scientifically meaningless, for example, to say that two hairs are a microscopic match when no study has ever been conducted to demonstrate how often certain hair characteristics occur in the general population.⁵⁴ However, when it comes to DNA evidence, numerous studies demonstrate the uniqueness of an individual's DNA in a given population.⁵⁵

Inaccurate forensic expert testimony has far-reaching and potentially lethal ramifications. A 2005 study concluded that testimony by forensics experts was second only to eyewitness testimony in causing wrongful convictions.⁵⁶ Erroneous forensic science was a factor in 63 percent of cases in which a defendant was convicted and then later exonerated on the basis of DNA evidence.⁵⁷

false positives; standard laboratory procedures subject to proficiency testing; and standards for analysis, interpretation, and reporting of results).

⁵² *Id.* at 139–40. “[P]opulation statistics for fingerprints have not been developed, and friction ridge analysis relies on subjective judgments by the examiner. Little research has been directed toward developing population statistic. . . .” *Id.*

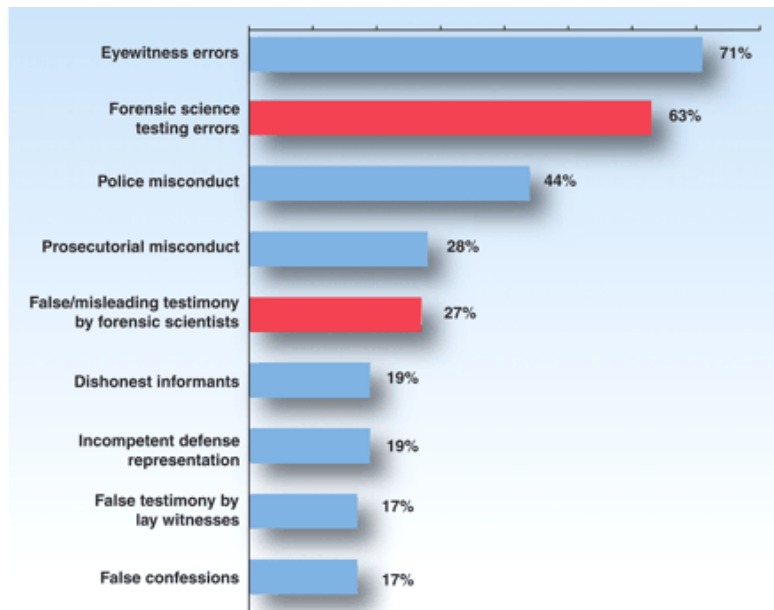
⁵³ See Thomas M. Fleming, Annotation, *Admissibility of DNA Identification Evidence*, 84 A.L.R. 4th 313 (1991). “DNA testing process relies on principles of statistics and population genetics to give statistical significance to DNA match, by indicating statistical frequency with which such matches might occur in population. . . .” *Id.*

⁵⁴ NAT'L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 157–60.

⁵⁵ *Id.* at 40.

⁵⁶ Michael J. Saks & Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 SCIENCE 893 (2005).

⁵⁷ *Id.*

Table 1⁵⁸

Defendants have a constitutional right to cross-examine the lab technicians who perform forensic analysis in their trials.⁵⁹ According to Sixth Amendment jurisprudence, technicians must be available for cross-examination because certificates or documents demonstrating positive matches function as testimony.⁶⁰ As the Supreme Court said in *Melendez-Diaz v. Massachusetts*, “[a]bsent a showing that the analysts were unavailable to testify at trial *and* that petitioner had a prior opportunity to cross-examine them, petitioner was entitled to ‘be confronted with’ the

⁵⁸ *Id.* at 892. Numbers exceed 100 percent because more than one factor was found in many cases. *Id.*

⁵⁹ See *Bullcoming v. New Mexico*, 131 S. Ct. 2705 (2011).

⁶⁰ *Id.* at 2710.

analysts at trial.”⁶¹ But what scientific testimony can be believed? Clearly not all forensic methods are scientifically reliable. What standards must scientific evidence meet in order to be admissible in court?

Courts have spoken to these issues in two famous cases—*Frye v. United States*⁶² and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁶³ While *Daubert* would seem to conflict with *Frye*, it is only binding in federal courts; states are free to use whichever test they prefer, and *Daubert* has not been universally adopted. A sizeable minority of states still use the *Frye* standard when determining the admissibility of scientific evidence and accompanying expert witness testimony.⁶⁴ Therefore, a discussion of both standards is essential to understand both how admissibility rules function and how they differ on a national scale.⁶⁵

A. The Frye Standard

In 1923, the Court of Appeals for the District of Columbia held that the results of a crude lie detector test were inadmissible.⁶⁶ The court stated that, in the field of scientific evidence, “the thing from which the deduction is

⁶¹ While this case revolved around drugs rather than a capital crime, the requirement that defendants be able to confront lab technicians certainly extends to murder trials. The precedent is both broad and important. “[T]he decision will have broader implications because the results of crime laboratory analysis are required whenever evidence such as a breath, hair, fiber, ballistic, soil, glass, paint, chemical, fingerprint, blood, DNA, or semen is crucial to support the prosecution’s case.” Bruce L. Ottley, *Beyond the Crime Laboratory: The Admissibility of Unconfirmed Forensic Evidence in Arson Cases*, 36 NEW ENG. J. ON CRIM. & CIV. CONFINEMENT 263, 264 (2010).

⁶² *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

⁶³ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

⁶⁴ Martin S. Kaufman, *The Status of Daubert in State Courts*, ATLANTIC LEGAL FOUND. (Mar. 31, 2006), <http://www.atlanticlegal.org/daubertreport.pdf> (noting that thirty states have at least tacitly accepted *Daubert*, fourteen have rejected it, and seven have neither accepted nor rejected it).

⁶⁵ Both standards are used in criminal and civil cases. *Frye* was a criminal case, while *Daubert* was a tort action. There are not different standards for the admissibility of evidence in criminal proceedings. See Federal Rules of Evidence 101, 104.

⁶⁶ *Frye*, 293 F. at 1014.

made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”⁶⁷ This became the nationwide standard for admissibility of scientific evidence.

The *Frye* standard admits only evidence that is generally accepted by the scientific community.⁶⁸ Thus, the *Frye* standard functions to limit the admissibility of untested or unproven scientific methodologies that have not been generally accepted. There is debate about whether *Frye* is a more lax or more stringent standard to meet than *Daubert*.⁶⁹

B. The Daubert Standard

Seventy years after *Frye*, the US Supreme Court articulated a new standard for the admissibility of scientific evidence in federal courts.⁷⁰ The Court held that the Federal Rules of Evidence had superseded the widely used *Frye* standard.⁷¹ Rule 702 speaks directly to the admissibility of scientific evidence: “If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.”⁷²

When determining whether expert testimony should be admitted, trial judges must engage in a two-part analysis, considering whether the expert will testify to scientific knowledge, and then whether that testimony will help the trier of fact understand or determine an issue in the case at bar.⁷³ The Court listed four factors that the trial judge might consider: (1) whether

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ Edward K. Cheng, *Does Frye or Daubert Matter? A Study of Scientific Admissibility Standards*, 91 VA. L. REV. 471 (2005).

⁷⁰ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 587 (1993).

⁷¹ *Id.*

⁷² *Id.* at 588 (quoting *United States v. Abel*, 469 U.S. 45, 51–52 (1984)).

⁷³ *Id.* at 592.

the technique has been tested; (2) whether the technique has been subjected to the rigors of peer review or publication; (3) the known or potential rate of error; and (4) whether the method has been generally accepted by the scientific community.⁷⁴ The Court did not, however, provide guidance as to which factors “were either necessary or sufficient components of an adequate criterion of the scientific method.”⁷⁵

Like under the *Frye* standard, trial judges in *Daubert* jurisdictions function as gatekeepers for scientific evidence, allowing only testimony they deem to be founded in scientific data.⁷⁶ But in cases of genuine disagreement among scientific practitioners, judges essentially “resolve qualified scientists’ disagreements about whether work is or is not genuinely scientific.”⁷⁷ Rather than defer to the scientific community, under the *Daubert* standard, judges ultimately determine what is and what is not science.⁷⁸

The Court clarified the *Daubert* standard in two other cases. In *General Electric Co. v. Joiner*, the Court held that appellate courts considering whether scientific testimony should have been included or excluded should use the abuse of discretion standard.⁷⁹ In *Kumho Tire Co., LTD v. Carmichael*, the Court clarified that the *Daubert* factors apply to all expert testimony, whether scientific or not.⁸⁰

While the *Daubert* standard would appear to impose more rigorous

⁷⁴ *Id.* at 593.

⁷⁵ Adina Schwartz, *A “Dogma of Empiricism” Revisited: Daubert v. Merrell Dow Pharmaceuticals, Inc., and the Need to Resurrect the Philosophical Insight of Frye v. United States*, 10 HARV. J.L. & TECH. 149, 159 (1997).

⁷⁶ *Id.* at 156.

⁷⁷ *Id.* at 158.

⁷⁸ *See id.*

⁷⁹ *General Electric Co. v. Joiner*, 522 U.S. 136 (1997); Craig Lee Montz, *Trial Judges as Scientific Gatekeepers after Daubert, Joiner, Kumho Tire, and Amended Rule 702: Is Anyone Still Seriously Buying This?*, 33 UWLA L. REV. 87 (2001).

⁸⁰ *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137 (1999); Montz, *supra* note 79, at 97.

requirements on the admissibility of evidence, paradoxically, it also allows “newly developed but well-reasoned theories” into the courtroom.⁸¹ It remains unclear which of the four factors enunciated by the Court are necessary to admit scientific evidence, or even how many must be satisfied in order to allow expert testimony.⁸²

The *Daubert* standard has been the subject of intense criticism.⁸³ While expert witnesses can be incredibly useful in helping juries determine technical points, asking lay members of the jury to decide whether a highly specialized and technical methodology is scientifically reliable is another matter entirely. Jury members simply lack the specialized knowledge necessary to reach such conclusions. As Paul Militch wrote just a year after the *Daubert* decision, “[i]n our rush to accept the very latest that modern science has to offer, we risk the absurd scenario of lay judges and juries judging the reliability of novel and controversial scientific evidence before science itself has completed its investigation and reached its own judgment.”⁸⁴

C. *Frye* or *Daubert*—Does It Matter?

Some scholars have suggested that whether a state adopts the *Frye* test or the *Daubert* test is immaterial.⁸⁵ Ultimately, some argue, *Daubert* increased “the overall awareness of judges—in all jurisdictions—to the problem of unreliable or ‘junk’ science.”⁸⁶ Since one of the four factors announced in

⁸¹ Montz, *supra* note 79, at 89 (quoting *Philips v. Industrial Machine*, 257 Neb. 256, 274 (1999)).

⁸² *Id.* at 97–98.

⁸³ See, e.g., Schwartz, *supra* note 75. See also Jay P. Kesan, *An Autopsy of Evidence in a Post-Daubert World*, 84 GEO. L.J. 1985 (1996).

⁸⁴ Paul S. Milich, *Controversial Science in the Courtroom: Daubert and the Law’s Hubris*, 43 EMORY L.J. 913, 914 (1994).

⁸⁵ See, e.g., Edward K. Cheng & Albert H. Yoon, *Does Frye or Daubert Matter? A Study of Scientific Admissibility Standards*, 91 VA. L. REV. 471, 474 (2005).

⁸⁶ *Id.*

Daubert is general acceptance—essentially the *Frye* test—courts still engage in similar inquiries, regardless of whether their jurisdiction has formally adopted *Frye* or *Daubert*. A 2001 study found that “state court judges not only found general acceptance to be the most useful *Daubert* factor, but that state judges also had a strikingly poor understanding of the other *Daubert* factors such as falsifiability and error rate.”⁸⁷

This appears to be true in the criminal context as well. A 2002 study of federal and state criminal appellate decisions on scientific admissibility over an eleven-year period found that “the adoption of the *Daubert* test, whether in state or federal court, had no statistically significant effect on admission rates.”⁸⁸ Indeed, statistical data suggests that courts use a “generalized level of scrutiny when considering the reliability of scientific evidence, regardless of the governing standard.”⁸⁹ Therefore, “debates about the practical merits and drawbacks of adopting a *Frye* versus a *Daubert* standard are largely superfluous.”⁹⁰

However, the matter is not entirely settled. In order to understand the importance, if any, of different admission standards for evidence in the context of the death penalty, it is necessary to briefly consider the state of modern capital punishment in the United States. This background information will, in turn, inform evaluations of the reliability of certain areas of forensic science in capital cases.

II. THE DEATH PENALTY TODAY

As Justice O’Connor famously wrote, “the execution of a legally and factually innocent person would be a constitutionally intolerable event.”⁹¹ In the past forty years, the Supreme Court has dealt with considerable

⁸⁷ *Id.* at 478.

⁸⁸ *Id.* at 478–79 (italics added).

⁸⁹ *Id.* at 503.

⁹⁰ *Id.* (italics added).

⁹¹ *Herrera v. Collins*, 506 U.S. 390, 419 (1993) (O’Connor, J., concurring).

misgivings over the death penalty.⁹² The death penalty in its modern form essentially began in 1972 with the Supreme Court's decision in *Furman v. Georgia*.⁹³ In *Furman*, the Court halted all executions nationwide amid deep concerns that defendants in capital cases were sentenced to death in the absence of any consistent standards governing the application of death sentences.⁹⁴ The Court held that the imposition of death sentences in the consolidated cases before it violated the Eighth Amendment's prohibition of cruel and unusual punishment.⁹⁵

While the Court did not produce a majority opinion (each Justice wrote separately; there are five concurring and four dissenting opinions), the strong language used even in the narrowest of the majority opinions denounced the arbitrary and capricious application of capital punishment. Justice Stewart, for instance, did not argue that the death penalty is always unconstitutional under the Eighth and Fourteenth Amendments, as Justices Brennan⁹⁶ and Marshall⁹⁷ did. Instead, Justice Stewart's opinion was limited to the application of the death sentence in the particular cases before the

⁹² See, e.g., *Kennedy v. Louisiana*, 554 U.S. 407 (2008) (holding that the Eighth Amendment prohibits death sentences for those convicted of child rape); *Ring v. Arizona*, 536 U.S. 584 (2002) (holding that the Sixth Amendment prohibits a judge from finding aggravating factors); *McCleskey v. Kemp*, 481 U.S. 279 (1987) (holding that apparent racial bias in the application of the death penalty was not unconstitutional because the defendant did not allege specific acts of racial bias in his own case); *Coker v. Georgia*, 433 U.S. 584 (1977) (holding that a death sentence for the rape of an adult woman violated the Eighth Amendment); *Woodson v. North Carolina*, 428 U.S. 280 (1976) (holding that a mandatory death sentence for first degree murder violates the Eighth Amendment).

⁹³ *Furman* completely changed the death penalty, and when the Court held in 1976 that a state's death penalty statute was constitutional, the statute required the use of bifurcated procedures. *Gregg v. Georgia*, 428 U.S. 153 (1976). Because the death penalty today is so different from pre-*Furman* capital punishment, I only discuss cases more recent than 1972 in any great depth.

⁹⁴ *Furman v. Georgia*, 408 U.S. 238 (1972).

⁹⁵ *Id.*

⁹⁶ *Id.* at 305 (Brennan, J., concurring).

⁹⁷ *Id.* at 371 (Marshall, J., concurring).

Court.

These death sentences are cruel and unusual in the same way that being struck by lightning is cruel and unusual. For, of all the people convicted of rapes and murders in 1967 and 1968, many just as reprehensible as these, the petitioners are among a capriciously selected random handful upon whom the sentence of death has in fact been imposed. . . . I simply conclude that the Eighth and Fourteenth Amendments cannot tolerate the infliction of a sentence of death under legal systems that permit this unique penalty to be so wantonly and so freakishly imposed.⁹⁸

After *Furman*, states reevaluated their death penalty procedures.⁹⁹ It was not until four years later, in *Gregg v. Georgia*, that a state's process for applying capital punishment convinced the Court that imposition of a death sentence would not violate the Eighth or Fourteenth Amendments.¹⁰⁰ The *Gregg* Court held that capital punishment does not always violate the Constitution—the bifurcated proceedings used in Georgia provided adequate protection against the arbitrary and capricious application of death sentences.¹⁰¹

Since the 1970s, protections for defendants in capital cases have been rolled back. In 1993, in *Herrera v. Collins*, the Supreme Court hinted that

⁹⁸ *Id.* at 309–11 (Stewart, J., concurring).

⁹⁹ CATHLEEN BURNETT, *WRONGFUL DEATH SENTENCES: RETHINKING JUSTICE IN CAPITAL CASES* 21–22 (2010).

Furman gave the states the opportunity to rewrite their statutes if they wanted to reinstate the death penalty. Many states did so. . . . The approved statutes provided for guidance of jury discretion through consideration of mitigating and aggravating factors; bifurcation of trials so that first guilt could be decided and then sentence, in hopes that sentencing would be specific to the individual; automatic appellate review of convictions and sentences and proportionality review.

Id.

¹⁰⁰ *Gregg v. Georgia*, 428 U.S. 153 (1976).

¹⁰¹ *Id.* at 191–92.

the execution of a factually innocent person might not necessarily violate the Eighth Amendment.¹⁰² The Court held that a claim of factual innocence does not entitle a defendant to federal habeas corpus relief.¹⁰³ Chief Justice Rehnquist, writing for the Court, said that “[c]laims of actual innocence based on newly discovered evidence have never been held to state a ground for federal habeas relief absent an independent constitutional violation occurring in the underlying state criminal proceeding.”¹⁰⁴ While Rehnquist’s majority opinion did not explicitly hold that executing an innocent defendant would be constitutionally permissible, the opinion did hold that a defendant convicted of a capital crime who claimed actual innocence did not have grounds for federal habeas relief.¹⁰⁵

Federal habeas protections have been even further limited. The Antiterrorism and Effective Death Penalty Act (AEDPA), passed in the aftermath of the Oklahoma City bombings, significantly limits federal judges’ power to grant relief.¹⁰⁶ Under the AEDPA, federal judges are to deny writs of habeas corpus for any claim heard in state court unless adjudication of the claim “resulted in a decision that was contrary to, or involved an unreasonable application of, clearly established Federal law, as determined by the Supreme Court” or “resulted in a decision that was based on an unreasonable determination of the facts in light of the evidence presented in the State court proceeding.”¹⁰⁷ In a post-*Herrera* and AEDPA world, defendants on death row have fewer opportunities to succeed in federal habeas claims, and claims of actual innocence do not constitute valid grounds for granting federal habeas relief.

In the past forty years, the Court has significantly limited the application

¹⁰² *Herrera v. Collins*, 506 U.S. 390, 404 (1993).

¹⁰³ *Id.*

¹⁰⁴ *Id.* at 400.

¹⁰⁵ *Id.*

¹⁰⁶ 28 U.S.C. § 2254 (1996).

¹⁰⁷ *Id.*

of the death penalty. It was not until 1977 that the Supreme Court held that a death sentence imposed for rape of an adult woman is unconstitutional.¹⁰⁸ (By implication, then, murder became the most common crime that might be eligible for a death sentence.) In 2002, the Court ruled that executions of “mentally retarded” defendants constituted cruel and unusual punishment under the Eighth Amendment.¹⁰⁹ And, until 2005, it was constitutionally permissible to execute defendants who were minors at the time their crimes were committed.¹¹⁰

Today, death sentences are usually imposed only for murder.¹¹¹ Capital punishment’s policy justifications and effectiveness in deterring crime are hotly contested issues, but beyond the scope of this article. Seventeen states and the District of Columbia have abolished the death penalty altogether.¹¹²

¹⁰⁸ *Coker v. Georgia*, 433 U.S. 584, 592 (1977) (holding that a death sentence for the crime of rape was unconstitutional because the Eighth Amendment prohibits excessive punishment).

¹⁰⁹ *Atkins v. Virginia*, 536 U.S. 304 (2002). The Court did not create a bright-line rule regarding the point at which low IQs translate to mental retardation. *Id.* However, the Court relied upon studies and statistics indicating that those with IQs “between 70 and 75 or lower” are considered mentally retarded. *Id.* at 309, n.5. Surprisingly, some inmates with IQs clearly indicating mental retardation are still executed despite the Court’s ruling. On August 7, 2012, Texas executed Marvin Wilson, a man with an IQ of just 61. *Convicted Murderer with IQ of 61 Executed in Texas*, CNN, Aug. 7, 2012, http://www.cnn.com/2012/08/07/justice/texas-execution/index.html?hpt=hp_t3.

¹¹⁰ In *Roper v. Simmons*, the Court declared that the executions of defendants who were under eighteen when their crimes occurred violated the Eighth and Fourteenth Amendments. *Roper v. Simmons*, 543 U.S. 551 (2005). Before *Roper*, juvenile executions occasionally occurred. See Stuart Banner, *When Killing a Juvenile Was Routine*, N.Y. TIMES, Mar. 5, 2005, http://www.nytimes.com/imagepages/2005/03/05/weekinreview/20050306_BANNER_CHART.html. In 1944, South Carolina electrocuted George Junius Stinney, Jr., when he was fourteen. *Id.* Stinney was the youngest person executed in the twentieth century. *Id.*

¹¹¹ This, of course, varies by jurisdiction. Some states also impose a death sentence for treason, aggravated rape, aggravated kidnapping, etc. See *Crimes Punishable by the Death Penalty*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/crimes-punishable-death-penalty#BJS> (last visited Oct. 8, 2012). But most death sentences today are the result of murder convictions. See *id.*

¹¹² *Facts about the Death Penalty*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/documents/FactSheet.pdf> (last updated Feb. 4, 2013).

Five more states have de facto moratoria, and several other states retain the penalty but, for various reasons, do not impose it.¹¹³ The states that retain the death penalty use bifurcated proceedings—the trial phase determines guilt, and only at the sentencing phase does the jury consider whether the defendant should receive death for his crime.¹¹⁴

Although most death sentences are not carried out, there are still more than three thousand people on death row.¹¹⁵ Indeed, as Professor James Liebman argues, the current system considerably overproduces death sentences because “police, prosecutors, judges, and juries operate with strong incentives to generate as many death sentences as they can—reaping robust psychic, political, and professional rewards—while displacing the costs of their many consequent mistakes onto capital prisoners, post-trial review courts, victims, and the public.”¹¹⁶ This pressure to pursue the death penalty is perhaps morbidly ironic in light of the Supreme Court’s view that the “quintessential miscarriage of justice is the execution of a person who is entirely innocent.”¹¹⁷ Is it possible that such an innocent has been executed?

III. POTENTIALLY WRONGFUL DEATH SENTENCES THAT DEPENDED ON QUESTIONABLE FORENSIC EVIDENCE

Death penalty cases are different than other criminal proceedings, and

Both Connecticut and New Mexico have prisoners on death row, sentenced before abolition, who might still be executed. *Id.*

¹¹³ *Death Penalty in Flux*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/death-penalty-flux> (last updated Feb. 6, 2013). The actual number in this category varies, particularly since one of the drugs used in lethal injections has recently become difficult or illegal to obtain. *See, e.g.*, Robbie Brown, *Arkansas Court Upends Death Penalty*, N.Y. TIMES, June 22, 2012, http://www.nytimes.com/2012/06/23/us/arkansas-justices-strike-down-death-penalty.html?_r=0.

¹¹⁴ BURNETT, *supra* note 99.

¹¹⁵ *Facts about the Death Penalty*, *supra* note 112.

¹¹⁶ James S. Liebman, *The Overproduction of Death*, 100 COLUM. L. REV. 2030, 2032 (2000).

¹¹⁷ *Schlup v. Delo*, 513 U.S. 298, 324–25 (1995).

courts have recognized this fact when dealing with issues of scientific evidence. In terms of DNA evidence, courts have

required a demonstration that accepted protocols established to ensure the authenticity of outcomes be followed before test results may be admitted in court. Surely, if there is one category of legal cases in which we should be certain that these important testing and evaluation protocols are followed, it is in death cases.¹¹⁸

The Supreme Court, too, has acknowledged the lack of an acceptable error rate.¹¹⁹ We turn our attention now to three areas of forensic science with varying degrees of reliability and acceptance in the scientific community and the stories of men whose fates were sealed by those methods.

A. Arson Investigations

Scientific understanding of fire has changed dramatically in the last several decades. Fire investigators historically reached conclusions using methods that have been thoroughly discredited today.¹²⁰ It was not until 1992 that the National Fire Protection Association promulgated the first scientifically based standards for arson investigations.¹²¹ Despite new standards,

the history of arson investigation involves myths that have been passed down through generations of fire investigators. Although the science exists to debunk lingering fire investigation myths, junk science continues to enter courtrooms through the testimony of some fire investigators who continue to ignore the science behind fire and rely on the “art” of arson investigation.¹²²

Formerly accepted arson investigation techniques have been thoroughly

¹¹⁸ Murray v. State, 838 So. 2d 1073, 1088 (Fla. 2002) (Anstead, J., concurring).

¹¹⁹ Schlup, 513 U.S. at 324–25.

¹²⁰ Paul C. Giannelli & Kimberly Gawel, *Arson Evidence*, 47 No. 6 CRIM. L. BULL. ART. 8 (2011).

¹²¹ *Id.*

¹²² *Id.*

discredited, calling into question expert testimony in many cases.¹²³

As early as 1977, the DOJ acknowledged that “[a]lthough burn indicators are widely used to establish the causes of fires, they have received little or no scientific testing.”¹²⁴ Indeed, the DOJ said that, in terms of burn indicators, “[t]here appears to be no published material in the scientific literature to substantiate their validity.”¹²⁵ Thirteen years later, fire scientists made a shocking discovery when they conducted the Lime Street experiment, which discredited traditional arson indicators.¹²⁶

Up until the Lime Street experiment, fire investigators were taught to recognize certain signs of arson. Crazed glass (where glass takes on a cracked, spider web-like appearance), burn trails, puddle configurations, and soot marks shaped like the letter “V” were all traditional hallmarks of an intentionally set fire.¹²⁷ Everything changed in 1990 when fire science experts demonstrated that many of the telltale signs of arson actually occurred in accidental fires.¹²⁸ An experiment designed to recreate a suspected arson—a crime for which the defendant faced the death penalty—led investigators to conclude that the original fire may have been accidental.¹²⁹ They observed that many of the phenomena traditionally associated with arson were actually present in the absence of any type of accelerant.¹³⁰ As David Grann explains, “[t]he Lime Street experiment . . .

¹²³ *Id.*

¹²⁴ Marc Price Wolf, *Habeas Relief from Bad Science: Does Federal Habeas Corpus Provide Relief for Prisoners Possibly Convicted on Misunderstood Fire Science?*, 10 MINN. J.L. SCI. & TECH. 213, 216 (2009) (quoting JOHN F. BOUDREAU ET AL., ARSON AND ARSON INVESTIGATION: SURVEY AND ASSESSMENT 88 (1977)).

¹²⁵ *Id.*

¹²⁶ John J. Lentini, *The Lime Street Fire: Another Perspective*, FIRE & ARSON INVESTIGATOR, <http://www.firescientist.com/Documents/TheLimeStreetFire-AnotherPerspective.pdf> (last visited Oct. 9, 2012).

¹²⁷ David Grann, *Trial by Fire*, NEW YORKER, Sept. 7, 2009, http://www.newyorker.com/reporting/2009/09/07/090907fa_fact_grann.

¹²⁸ Lentini, *supra* note 126; *see also* Grann, *supra* note 127.

¹²⁹ Lentini, *supra* note 126.

¹³⁰ *Id.*

demolished prevailing notions about fire behavior.”¹³¹ John Lentini, a noted fire expert, remarked, “[t]his was my epiphany. I almost sent a man to die based on theories that were a load of crap.”¹³²

Before the Lime Street experiment, fire investigators generally believed that rapidly spreading fires were caused by the presence of accelerants.¹³³ Now, scientists recognize that the phenomenon of flashovers in accidental fires actually produce results that previously had been interpreted as clear signs of arson. Flashovers can occur with fires in enclosed spaces.¹³⁴ Thick layers of smoke near the ceiling rise in temperature, and if it approaches approximately 1,100 degrees Fahrenheit, the fire reaches a flashover point, causing everything nearby to combust.¹³⁵

Post-flashover burning may be responsible for low-wall burning, floor-burn patterns, “and even holes in the floor. Each of these indicators has been used by fire investigators in the past to conclude that a fire was incendiary in origin. Moreover, a flashover can occur within one and one-half minutes from the initial spark or open flame.”¹³⁶

A new understanding of flashovers is not the only recent paradigm shift to completely upset previously accepted fire investigation practices. Modern science has also indicated that collapsed springs, certain burn patterns, and damage to metals are not the dispositive indicators of arson they were once believed to be.¹³⁷ These results can occur in accidental fires as well.

Even today, though, arson investigators may not rely on a firm foundation of science. In 1997, nearly a decade after the Lime Street experiment, the International Association of Arson Investigators filed a

¹³¹ Grann, *supra* note 127.

¹³² *Id.*

¹³³ Wolf, *supra* note 124, at 221.

¹³⁴ *Id.*

¹³⁵ *Id.*

¹³⁶ *Id.*

¹³⁷ *Id.* at 223–25.

brief arguing that arson investigators should not be required to use the scientific method.¹³⁸ Arson investigation, they said, was “less scientific” than other disciplines.¹³⁹ In recent years, more than a dozen court opinions have confronted the issue of allowing the testimony of canine handlers whose trained dogs indicated the presence of accelerants at a crime scene when samples sent to crime laboratories came back negative for any accelerants.¹⁴⁰ All but three have allowed the testimony, even though it directly contradicted the labs’ findings.¹⁴¹ Courts in New Jersey and Illinois, both *Frye* jurisdictions, rejected the uncorroborated testimony.¹⁴² “In practice, the *Frye* test in arson cases means that techniques of investigation that have not been peer reviewed and gained ‘general acceptance’ within the arson investigation community are inadmissible. Only when the theory or procedures have gained such acceptance are they admissible.”¹⁴³ In 2009, the National Academy of Sciences report on the state of modern forensics concluded that much more research is needed in the area of fire investigations.¹⁴⁴ “Experiments should be designed to put arson investigations on a more solid scientific footing.”¹⁴⁵

Arson investigations remain critical—if a fire was not caused by arson, no crime has been committed.¹⁴⁶ Despite significant advances in the understanding of fire, defendants who have already been convicted of arson face difficulties in mounting successful legal challenges to their

¹³⁸ Grann, *supra* note 127.

¹³⁹ *Id.*

¹⁴⁰ Ottley, *supra* note 61, at 267.

¹⁴¹ *Id.*

¹⁴² *Id.* at 284.

¹⁴³ *Id.* (italics added).

¹⁴⁴ NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 170–73.

¹⁴⁵ *Id.*

¹⁴⁶ Paul C. Giannelli, *The Execution of Cameron Todd Willingham: Junk Science, an Innocent Man, and the Politics of Death* 4 (Case Research Paper Series in Legal Studies, Working Paper 2011-18, 2011), available at <http://ssrn.com/abstract=1917454>.

convictions, especially in federal habeas claims.¹⁴⁷ Marc Price Wolf, author of *Habeas Relief from Bad Science*, argues that habeas claims are the most important post-conviction procedures available to arson defendants because those who were convicted under the old regime of fire science have probably exhausted all of their other post-conviction appeals.¹⁴⁸ In order for a defendant to prevail in a federal habeas suit, the underlying conviction would have to depend entirely upon investigators' incorrect scientific findings.¹⁴⁹ If there is any other circumstantial evidence, the court will likely reject the habeas claim.¹⁵⁰

1. Cameron Todd Willingham

In 2004, Cameron Todd Willingham was executed for the 1991 deaths of his three young children. The children died in a fire that swept through their home in Corsicana, Texas.¹⁵¹ Local fire investigators observed puddle-shaped patterns on the floor and spiderweb-like patterns on windows, which they interpreted as signs that a liquid accelerant had been used.¹⁵² They also determined that there were multiple points of origin, indicating that the fire had been purposefully set.¹⁵³ With that determination, the fire became a triple homicide, and Willingham the prime suspect.¹⁵⁴

Willingham rejected a plea deal that would have taken a death sentence off the table, and his case proceeded to trial.¹⁵⁵ The prosecution's case revolved around the testimony of deputy fire marshal Manuel Vasquez, who

¹⁴⁷ Wolf, *supra* note 124, at 214.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.* at 246.

¹⁵⁰ *Id.*

¹⁵¹ Grann, *supra* note 127.

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

testified that he had found more than “twenty indicators” of arson.¹⁵⁶ The jury deliberated for only an hour.¹⁵⁷ Willingham was convicted and then sentenced to death.¹⁵⁸ Willingham maintained his innocence for the rest of his life.¹⁵⁹

After his appeals were exhausted, and as Willingham’s execution date neared, his attorney sent a copy of the case file to renowned fire science expert Dr. Gerald Hurst.¹⁶⁰ Dr. Hurst reviewed floor plans, reports, and videos of the scene.¹⁶¹ Dr. Hurst could not, of course, visit the scene, and so it was impossible to determine precisely where the fire originated.¹⁶² However, his review of the case file led him to conclude that the fire was probably accidental.¹⁶³ Dr. Hurst made his findings as Willingham’s execution date was drawing close. He drafted a report concluding that there was no evidence of arson and that “a man who had already lost his three children and spent twelve years in jail was about to be executed based on ‘junk science.’”¹⁶⁴

Despite Dr. Hurst’s findings that nothing in the evidence supported a conclusion of arson, the Texas Board of Pardons and Paroles denied Willingham’s request for clemency.¹⁶⁵ One of the board members later said, “We get all kinds of reports, but we don’t have the mechanisms to vet them.”¹⁶⁶ Willingham was executed on February 17, 2004.¹⁶⁷ He proclaimed his innocence until the very end. His final words were: “The only statement

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

I want to make is that I am an innocent man convicted of a crime I did not commit. I have been persecuted for twelve years for something I did not do. From God's dust I came and to dust I will return, so the Earth shall become my throne."¹⁶⁸

Four experts contacted by the *Chicago Tribune* reviewed Willingham's case files and concluded that the initial investigation was deeply flawed—the fire might have been accidental.¹⁶⁹ Dr. Hurst again insisted that Willingham was likely innocent, stating: "There's nothing to suggest to any reasonable arson investigator that this was an arson fire."¹⁷⁰ A 2006 report by the Arson Review Committee, commissioned by the Innocence Project, concluded that the fire was accidental.¹⁷¹ "The artifacts examined and relied upon by the fire investigators . . . are the kind of artifacts routinely created by accidental fires that progress beyond flashover."¹⁷² The Committee determined that the Corsicana fire had been "grossly misinterpreted."¹⁷³ The Committee denounced the initial investigators' conclusions, finding that "each and every one of the indicators relied upon have since been scientifically proven to be invalid."¹⁷⁴

Not everyone has embraced the new scientific understandings of fire. Although one of the state deputy fire marshals involved in the original investigation said that "[a]t the time of the Corsicana fire, we were still

¹⁶⁸ *Id.*

¹⁶⁹ Steve Mills & Maurice Possley, *Man Executed on Disproved Forensics: Fire that Killed His 3 Children Could Have Been Accidental*, CHI. TRIB., Dec. 9, 2004, <http://www.chicagotribune.com/news/nationworld/chi-0412090169dec09,0,7443588,full.story>.

¹⁷⁰ *Id.*

¹⁷¹ DOUGLAS J. CARPENTER ET AL., INNOCENCE PROJECT, REPORT ON THE PEER REVIEW OF THE EXPERT TESTIMONY IN THE CASES OF STATE OF TEXAS V. CAMERON TODD WILLINGHAM AND STATE OF TEXAS V. ERNEST RAY WILLIS 3 (2006), available at <http://www.innocenceproject.org/docs/ArsonReviewReport.pdf>.

¹⁷² *Id.*

¹⁷³ *Id.* at 19.

¹⁷⁴ *Id.* at 3.

testifying to things that aren't accurate today. . . . We know now not to make those same assumptions,"¹⁷⁵ new arson investigation techniques have been met with resistance. As Dr. Hurst said, "[y]ou've got tons of holdouts—good old boys who've investigated 5,000 fires, and they are doing it the same way they've always done it."¹⁷⁶ Indeed, in January 2011, the Texas State Fire Marshal's office told members of the Texas Forensic Science Commission (which had convened to consider the scientific validity of the 1991 arson investigation) that the office stands behind the investigation and its conclusions, even going so far as to say that the office might reach the same findings if the case were to be investigated today.¹⁷⁷

Despite the rather considerable evidence that the fire that claimed his children's lives was accidental, Willingham has not received a posthumous exoneration. In 2005, amid growing concerns about inadequate forensic procedures, Texas established the Forensic Science Commission to regulate the state's crime labs.¹⁷⁸ Just two days before the Commission was to hear expert testimony condemning fire investigation techniques used in the Willingham case, Texas Governor Rick Perry replaced three committee members.¹⁷⁹ Their replacements greatly limited the investigation.¹⁸⁰ Perry has maintained that Willingham was guilty, referring to him as a

¹⁷⁵ Mills & Possley, *supra* note 169.

¹⁷⁶ Maurice Possley, *Arson Myths Fuel Errors: Debunked Theories Plague Fire Probes, Lead to Wrongful Arrests, Prosecutions*, CHI. TRIB., Oct. 18, 2004, http://articles.chicagotribune.com/2004-10-18/news/0410180222_1_arson-investigators-fires-ernest-willis.

¹⁷⁷ Dave Mann, *Fire Marshal: Willingham Case Was Fine and Dandy*, TEXAS OBSERVER, Jan. 7, 2011, <http://www.texasobserver.org/contrarian/fire-marshal-willingham-case-was-fine-and-dandy>.

¹⁷⁸ Matt Smith & Ed Lavandera, *Perry 'Squashed' Texas Execution Probe, Ex-official Says*, CNN, Sept. 7, 2011, <http://www.cnn.com/2011/POLITICS/09/07/texas.execution.probe/index.html> (citing a "series of embarrassing scandals" as the reason for establishing the Texas Forensic Science Commission in 2005).

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

“monster.”¹⁸¹

B. Hair Analysis

Before the advent of DNA testing, hair analysis involved the use of a microscope to compare the physical characteristics of two hairs. Today, hair can be analyzed for mitochondrial DNA, but microscopic comparisons are still conducted. The results from hair comparisons are not as conclusive as DNA analysis, but hair comparison can be useful in narrowing the suspect pool.¹⁸² Hair examiners look at hair collected from a crime scene and compare it to hair from a known subject.¹⁸³ The technique was first used in German courts in the 1860s, and it made its way into American courts within the subsequent twenty years.¹⁸⁴

Though waning in popularity, the method is still used and does have some practical scientific groundings and applications.¹⁸⁵ Hairs are compared to one another to determine if they could have come from the same individual. But since there have been no studies demonstrating “the frequency with which particular characteristics of hair are distributed in the population,”¹⁸⁶ the results of a comparative microscopic hair analysis could only assist law enforcement officials in excluding certain individuals from the suspect pool.¹⁸⁷ A DNA test might then be performed to test definitively for a match. But without DNA profiling (or at least mitochondrial DNA profiling), microscopic hair analysis “cannot uniquely identify one

¹⁸¹ Perry: Willingham ‘a Monster’, CORSICANA DAILY SUN, Oct. 14, 2009, <http://corsicanadailysun.com/local/x546110996/Perry-Willingham-a-monster>.

¹⁸² NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 188.

¹⁸³ BARRY SCHECK ET AL., ACTUAL INNOCENCE: WHEN JUSTICE GOES WRONG AND HOW TO MAKE IT RIGHT 208 (2003).

¹⁸⁴ *Id.*

¹⁸⁵ NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 188.

¹⁸⁶ *Id.*

¹⁸⁷ *Id.*

person.”¹⁸⁸

The current scandal at the DOJ demonstrates the breadth of this problem—thousands of cases involving hair comparisons conducted by the FBI have been called into question.¹⁸⁹ The National Academy of Sciences suggests that microscopic hair analysis can still be a valid technique, albeit one that must play a subordinate and supporting role to eventual DNA analysis. For example, a hair comparison might help technicians determine which samples warrant the effort and expense of DNA testing.¹⁹⁰ The Academy stresses, though, that there are “[n]o scientifically accepted statistics . . . about the frequency with which particular characteristics of hair are distributed in the population.”¹⁹¹ Moreover, there are no standards regarding the number of similar features required to constitute a match.¹⁹²

In their 1996 article, *Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil?*, Clive Smith and Patrick Goodman considered the state of forensic hair analysis and concluded that “[i]t [was] time for a reevaluation. If the purveyors of this dubious science cannot do a better job of validating hair analysis than they have done so far, forensic hair comparison analysis should be excluded altogether from criminal trials.”¹⁹³ Indeed, the authors argue that “forensic hair comparison analysis has been accepted uncritically into criminal prosecutions, without being subjected to the validation required of any legitimate science.”¹⁹⁴ The complete lack of empirical studies demonstrating the reliability of hair comparison analysis renders the technique scientifically unsound.

¹⁸⁸ *Id.*

¹⁸⁹ Hsu, *Forensic Evidence*, *supra* note 3.

¹⁹⁰ NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 188.

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ Clive A. Stafford Smith & Patrick D. Goodman, *Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil?*, 27 COLUM. HUM. RTS. L. REV. 227, 231 (1996).

¹⁹⁴ *Id.*

Why then, in light of such deep concerns about the independent validity of forensic comparative hair analysis, is such evidence admitted into court? Perhaps it has something to do with habit—after all, comparative hair analysis has been accepted in courts since the nineteenth century.¹⁹⁵ It would seem, however, that under the *Daubert* standard, such evidence might not be admissible. The utter lack of reliable studies demonstrating, among other things, the technique’s reliability and potential error rate¹⁹⁶ would presumably prevent an unsubstantiated pseudo-science like hair comparison from being accepted in court. But the general acceptance factor, which essentially reproduces the *Frye* test, could be sufficient to allow the evidence into trial. After all, comparative microscopic hair analysis is an established science, dating back well over a century.

Studies by practitioners, while largely discredited by the larger scientific community,¹⁹⁷ were conducted, though even those questionable conclusions are decades old.¹⁹⁸ Even the National Academy of Sciences’ 2009 report on forensic science only cites to one hair analysis study published since 1990.¹⁹⁹ In 1996, Smith and Goodman wrote, “No effort has been made in the United States to empirically prove anything in this field, at any time, yet men and women lose life and liberty on the basis of this untested evidence.”²⁰⁰ It does not appear that there have been any considerable changes in the field since they reached that conclusion. In fact, there is precious little information at all regarding hair analysis. And, as Smith and Goodman warned, lives hang in the balance.²⁰¹

¹⁹⁵ *See id.*

¹⁹⁶ *See* NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 183–91.

¹⁹⁷ *See* Smith & Goodman, *supra* note 193.

¹⁹⁸ *Id.*

¹⁹⁹ M.M. Houck & R.E. Bisbing, *Forensic Human Hair Examination and Comparison in the 21st Century*, 17 FORENSIC SCIENCE REVIEW 7 (2005).

²⁰⁰ *See* Smith & Goodman, *supra* note 193, at 290–91.

²⁰¹ *Id.*

1. Claude Jones

Career criminal Claude Jones was executed in Texas in 2000 for the murder of a liquor store owner.²⁰² Jones maintained that he had never committed murder—in fact, he claimed that he had not even entered the liquor store—but he was convicted, largely because of a strand of hair²⁰³ two centimeters long.²⁰⁴ The hair was the only physical evidence indicating that Jones had entered the liquor store that day, and a forensic expert testified that the hair, found on the counter, was a match to Jones.²⁰⁵ At trial, the technician told the jury that the hair could only have come from Jones.²⁰⁶

The hair was not tested for DNA before Jones was executed.²⁰⁷ The day before he was put to death, his attorneys asked then-Governor George W. Bush for a stay of execution so the hair could finally be tested.²⁰⁸ Puzzlingly, the memo prepared for the governor by his staff on the Jones case did not mention Jones's request that the hair be tested.²⁰⁹ The stay was denied, and Jones died by lethal injection on December 7, 2000.²¹⁰ He was

²⁰² Dave Mann, *DNA Tests Undermine Evidence in Texas Execution: New Results Show Claude Jones Was Put to Death on Flawed Evidence*, TEXAS OBSERVER, Nov. 11, 2010, <http://www.texasobserver.org/cover-story/texas-observer-exclusive-dna-tests-undermine-evidence-in-texas-execution> [hereinafter Mann, *Tests Undermine Evidence*].

²⁰³ *Id.*

²⁰⁴ Letter from Terry Melton, Lab. Dir., Mitotyping Technologies & Charity A. Holland, Quality Manager, Mitotyping Technologies to Barry Scheck, Innocence Project, Inc., William H. Knull, III, Mayer Brown LLP & Jonathan Petix (Nov. 11, 2010), available at http://www.innocenceproject.org/docs/jones/jones_dna_report.pdf [hereinafter Letter from Melton & Holland].

²⁰⁵ *Injustice in Texas: The Claude Jones Case*, INNOCENCE PROJECT, http://www.innocenceproject.org/Content/Injustice_in_Texas_The_Claude_Jones_Case.php (last visited Feb. 9, 2013).

²⁰⁶ *Id.*

²⁰⁷ *Id.*

²⁰⁸ Mann, *Tests Undermine Evidence*, *supra* note 202.

²⁰⁹ Letter from Melton & Holland, *supra* note 204.

²¹⁰ Mann, *Tests Undermine Evidence*, *supra* note 202.

the last man executed in Texas under Governor Bush.²¹¹

For a while, Jones was forgotten. But in 2007, the Innocence Project, in conjunction with the *Texas Observer* and the Texas Innocence Network, filed a suit to compel the testing of the hair, which had remained in storage in the county courthouse.²¹² After a nearly three-year court battle, a judge ordered the prosecutors to allow the hair to be tested for DNA.²¹³

In November 2010, nearly ten years after Jones's death, the results of the DNA test done on the hair found at the crime scene were released.²¹⁴ The laboratory explicitly ruled out Jones as a possible donor.²¹⁵ Instead, the hair matched the victim.²¹⁶ If the hair had belonged to Jones, his conviction would have been supported by reliable scientific practices—DNA would have established at least that he had been present in the store. If the hair had belonged to an unknown person, this would have indicated that another person had been at the crime scene, suggesting that the donor of the hair was the true killer.²¹⁷ But instead, the hair matched the victim, and therefore did not definitively prove Jones's guilt or innocence.²¹⁸ That said, Jones could not have received a death sentence on the basis of such evidence; Texas law requires more evidence than just one eyewitness in order to impose the death penalty, and a questionable eyewitness report was the only other evidence against Jones.²¹⁹ The evidence indicating that an innocent

²¹¹ *DNA Tests Suggest Claude Jones, Last Man Executed under Gov. George W. Bush, May Have Been Convicted on Flawed Evidence*, HUFFINGTON POST, May 25, 2011, http://www.huffingtonpost.com/2010/11/13/claude-jones-dna-tests-executed_n_783085.html.

²¹² Mann, *Tests Undermine Evidence*, *supra* note 202.

²¹³ *Id.*

²¹⁴ *Id.*

²¹⁵ *Id.*

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ *Id.*

²¹⁹ *All Things Considered: Interview with Dave Mann by Matt Largey*, KUT RADIO (audio recording 2010), available at <http://www.texasobserver.org/media/k2/audio/DNA.mp3> [hereinafter *Interview with Mann*].

man was executed is less strong here than in the Willingham case, but at the very least, the DNA test result calls Jones's conviction into question and casts serious doubt upon the scientific foundations of comparative microscopic hair analysis.

C. DNA Evidence: The Gold Standard?

DNA is an increasingly important tool in determining guilt or innocence. More than three hundred prisoners have been exonerated on the basis of DNA evidence;²²⁰ eighteen of those prisoners had been sentenced to death.²²¹ But DNA evidence is far from foolproof. Israeli scientists have demonstrated that DNA evidence can be fabricated using a simple process.²²² If scientists have access to a DNA profile, they can “construct a sample of DNA to match that profile without obtaining any tissue from that person.”²²³ The process is uncomplicated; “[a]ny biology undergraduate could perform this,” said Dr. Dan Frumkin, the lead author of *Authentication of Forensic DNA Samples*.²²⁴

Forensic laboratories across the country have been plagued by problems, some caused by general sloppiness, others by actual maliciousness.²²⁵ The National Academy of Sciences acknowledges this is an important problem, one to which not even DNA laboratories are immune.²²⁶ Errors in DNA

²²⁰ *Innocence Project Case Profiles*, INNOCENCE PROJECT, <http://www.innocenceproject.org/know/> (last visited Feb. 9, 2013).

²²¹ *Id.* See also *INNOCENCE: Louisiana Death Row Inmate Exonerated Through DNA After 15 Years*, DEATH PENALTY INFO. CTR., <http://www.deathpenaltyinfo.org/innocence-louisiana-death-row-inmate-exonerated-through-dna-after-15-years> (last visited Feb. 9, 2013).

²²² Andrew Pollack, *DNA Evidence Can Be Fabricated, Scientists Show*, N.Y. TIMES, Aug. 17, 2009, <http://www.nytimes.com/2009/08/18/science/18dna.html>.

²²³ *Id.*

²²⁴ *Id.*

²²⁵ See Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. REV. 163, 167 (2007) [hereinafter Giannelli, *Wrongful Convictions*].

²²⁶ NAT'L RESEARCH COUNCIL, *STRENGTHENING*, *supra* note 21, at 132.

results are usually the result of “interpretational ambiguities” or “inappropriately processed and/or contaminated” samples.²²⁷ “Errors as small and unintentional as an analyst accidentally squeezing a pipette into the wrong tube, or forgetting to change gloves after an extraction, can compromise critical evidence.”²²⁸

Sometimes, though, laboratory errors are not the result of mistakes or carelessness. In *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, Professor Paul C. Giannelli cites instances of “[f]orged fingerprints, faked autopsies, false laboratory reports, and perjured testimony,” among other examples of crime lab technicians who have acted inappropriately.²²⁹ Forensics labs can and do manipulate DNA evidence to obtain results favorable to law enforcement.²³⁰ Giannelli describes many examples of crime lab technicians who purposefully perjured themselves or withheld potentially exculpatory evidence from the defense.²³¹ This is by no means proof that most, or even many, forensic technicians are purposefully dishonest. But a lack of standards and supervision has created an environment in which misconduct of this type does occur.

1. Crime Laboratory Mistakes, Mistruths, and Lies

One Oklahoma City forensic chemist who worked on many cases over the course of her years with the local forensics lab appears to have falsified evidence in dozens of cases.²³² Known for her seemingly magical abilities to find forensic matches to suspects, Joyce Gilchrist became a favorite in

²²⁷ *Id.*

²²⁸ Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 CAL. L. REV. 721, 754–55 (2007).

²²⁹ Giannelli, *Wrongful Convictions*, *supra* note 225, at 169.

²³⁰ *Id.*

²³¹ *Id.*

²³² See Paul C. Giannelli, *Scientific Fraud* (Case Research Paper Series in Legal Studies, Working Paper 2010–36, 2010), available at <http://ssrn.com/abstract=1706949>.

the Oklahoma City courthouse.²³³ However, Gilchrist “appears to have used her lab tests to confirm the detectives’ hunches rather than seek independent scientific results. . . . She systematically destroyed evidence at the very time she knew that much of that evidence might be retested.”²³⁴

One of the most egregious cases was that of Malcolm Rent Johnson, who was executed in 2000.²³⁵ At his trial, Gilchrist testified that semen and hairs found at the crime scene were consistent with the defendant’s blood type.²³⁶ Despite an expert witness’s testimony during Johnson’s appeal that “Gilchrist had testified beyond the bounds of accepted science,”²³⁷ Johnson was executed. It was not until a scandal surrounding Gilchrist’s work erupted that his attorneys filed to have the evidence reexamined. Independent analysts concluded that there was no sperm²³⁸ on any of the slides taken from the victim’s bed.²³⁹ However, sperm was present on the slides taken from the victim’s vaginal smears.²⁴⁰ This completely contradicts Gilchrist’s testimony at trial—namely that the samples from the bed had contained semen consistent with Johnson’s blood type, and that the vaginal slides had not contained enough sperm to test.²⁴¹

Mark Fuhrman, who investigated the Gilchrist scandal, said that in the Johnson case, “Gilchrist got it entirely wrong. She didn’t see sperm where sperm was present, yet she testified to sperm being present and matching

²³³ MARK FUHRMAN, *DEATH & JUSTICE* 88 (2003).

²³⁴ *Id.* at 232.

²³⁵ *Id.* at 65.

²³⁶ *Id.* at 60. Giannelli, *Wrongful Convictions*, *supra* note 225, at 179. Giannelli asserts that Johnson was not given the opportunity to present evidence that would have called Gilchrist’s findings into question. *Id.*

²³⁷ FUHRMAN, *supra* note 233, at 64.

²³⁸ Genetic material is contained in sperm cells. Without sperm cells, semen does not provide material for a DNA analysis.

²³⁹ Giannelli, *Wrongful Convictions*, *supra* note 225, at 179.

²⁴⁰ FUHRMAN, *supra* note 233, at 67.

²⁴¹ *Id.* at 60.

the defendant's blood type where there wasn't any."²⁴² It appears that the slides were not properly prepared, because the slides that should have contained sperm had only fibers.²⁴³ The only remaining evidence was hair collected from the crime scene. The hair could be tested for mitochondrial DNA, a technique unavailable at the time of Johnson's trial.²⁴⁴ It is possible that Oklahoma may have executed an innocent man, but Oklahoma City defense attorneys are doubtful that they will ever know with any certainty whether Johnson was innocent.²⁴⁵

When news of Gilchrist's possible evidence tampering became public, the FBI launched an investigation into eight of the cases she had worked on.²⁴⁶ The results were damning.²⁴⁷ Five of the cases reviewed involved microscope slides.²⁴⁸ Supervisory Special Agent (SSA) Douglas Deedrick examined the slides and found "errors in identification or interpretation" in all of them.²⁴⁹ Hairs that Gilchrist had affirmatively matched to defendants "were either too limited for meaningful comparison purposes or associated incorrectly."²⁵⁰ In the only reviewed fiber case, SSA Deedrick concluded that "the questioned fibers did not exhibit the same microscopic characteristics as the known fibers."²⁵¹

In addition to making incorrect matches, Gilchrist also overstated her scientific expertise. At the trial of Jeffrey Todd Pierce, she testified that she

²⁴² *Id.* at 67.

²⁴³ *Id.* at 66–67.

²⁴⁴ *Id.* at 68. The evidence, however, has been taken into federal custody as part of a grand jury investigation of Gilchrist. *Id.*

²⁴⁵ *Id.*

²⁴⁶ *Id.*

²⁴⁷ Douglas Deedrick, Supervisory Special Agent, Summary of Case Reviews of Forensic Chemist, Joyce Gilchrist, Oklahoma City Police Department Crime Laboratory 1 (Apr. 4, 2001) (on file with author).

²⁴⁸ *Id.*

²⁴⁹ *Id.*

²⁵⁰ *Id.*

²⁵¹ *Id.*

believed fibers found on the suspect's shoe could only have gotten there "either during the crime or after the crime occurred."²⁵² SSA Deedrick's analysis of the fibers concluded that "[i]t was obvious . . . that the synthetic fibers did not exhibit the same microscopic characteristics."²⁵³ Gilchrist also testified that "hairs are "unique" to an individual, and misrepresent[ed] the science of hair comparisons."²⁵⁴

While the FBI report on Gilchrist focuses on hair and fiber analysis, the problems uncovered in the Oklahoma City Crime Laboratory are not unique. Sloppiness, ignorance, and a desire to help convict a known suspect can also impact DNA results. In 2004, the *Seattle Post-Intelligencer* identified twenty-three major cases in Seattle with errors or contamination, including multiple homicides and child rapes.²⁵⁵ Contamination can occur very easily, such as "when the analyst talks while handling a sample, leaving an invisible deposit of saliva."²⁵⁶

The incidents in Seattle are hardly isolated. "Scandals have plagued the state crime labs in North Carolina, California, Virginia, Illinois, Maryland, West Virginia, and Mississippi; the city crime labs in Houston, Cleveland, Chicago, Omaha, Oklahoma City, Washington, and San Francisco; the county lab in Nassau County, New York; and even at the FBI and Army crime labs."²⁵⁷ Technicians in San Francisco switched test tubes containing DNA evidence in a homicide case and then, with the help of the local

²⁵² *Id.* at 4.

²⁵³ *Id.*

²⁵⁴ *Id.* at 5.

²⁵⁵ *DNA Testing Mistakes at the State Patrol Crime Labs*, SEATTLE P.I., July 21, 2004, <http://www.seattlepi.com/local/article/DNA-testing-mistakes-at-the-State-Patrol-crime-1149846.php>.

²⁵⁶ *Id.*

²⁵⁷ Radley Balko, *Private Crime Labs Could Prevent Errors, Analyst Bias: Report*, HUFFINGTON POST, Aug. 14, 2011, http://www.huffingtonpost.com/2011/06/14/the-case-for-private-crime-labs_n_876963.html.

district attorney, concealed what they had done for nearly two years.²⁵⁸ A crime lab in North Carolina was investigated by the FBI after a man named Greg Taylor was released from prison sixteen years after his murder conviction because the blood evidence used to convict him was not actually blood at all.²⁵⁹ The FBI probe calls into question the convictions of more than 230 defendants, three of whom have been executed.²⁶⁰ The list of egregious mistakes and malicious conduct goes on and on. The number of defendants affected by these many crime laboratory scandals may never be known.

2. Access to Exculpatory and DNA Evidence

The primary problem with forensic techniques is that legal standards are slow to adapt to shifting scientific paradigms. That, of course, is not to say that no jurisdictions that have retired outmoded techniques. But one need only consider the “good old boys” mentioned by Dr. Hurst²⁶¹ to know that some forensic analysts prefer to maintain the same forensic procedures they have always used. The heart of this issue is that, even in light of new evidence casting doubt upon the veracity of forensic methods, defendants convicted with evidence that predates scientific advances are left with precious little recourse.

Despite its increasing importance, DNA evidence is not available in all, or even in a majority, of crime investigations. Most crimes do not involve

²⁵⁸ Peter Jamison, *SFPD Crime Lab's DNA Evidence Could Be Tainted by Concealed Mistakes*, SF WEEKLY, Dec. 15, 2010, <http://www.sfweekly.com/2010-12-15/news/sfpd-s-troubled-crime-lab-more-evidence-of-screwups-and-coverups/>.

²⁵⁹ Radley Balko, *North Carolina's Corrupted Crime Lab: A Damning State Report Finds Systematic Abuse, Including in Death Penalty Cases*, REASON.COM (Aug. 23, 2010), <http://reason.com/archives/2010/08/23/north-carolinas-corrupted-crim/singlepage>.

²⁶⁰ Mandy Locke, Joseph Neff & J. Andrew Curliss, *Scathing SBI Audit Says 230 Cases Tainted by Shoddy Investigations*, NEWSOBSERVER.COM (Mar. 27, 2011), <http://www.newsobserver.com/2010/08/19/635632/scathing-sbi-audit-says-230-cases.html>.

²⁶¹ Grann, *supra* note 127.

the genetic material necessary to perform a DNA profiling analysis.²⁶² While post-conviction testing has exonerated eighteen men sentenced to death, one must consider the huge number of cases—approximately 80 percent of criminal cases—in which DNA testing is not a possibility.²⁶³ For example, in Maryland in 1985, Kirk Bloodsworth was convicted of the rape and murder of a child and sentenced to death.²⁶⁴ But nine years later, semen from the crime scene was tested and it was not a match to Bloodsworth.²⁶⁵ As the authors of *Actual Innocence* argue, Bloodsworth “owes his life to the depravity of a murderer.”²⁶⁶ If the victim had not been raped, there would have been no exculpatory evidence, and Bloodsworth would have been executed.²⁶⁷ In a perverse way, Bloodsworth is incredibly lucky.

Even setting aside the possibility that DNA analysts might purposefully taint samples in the minority of cases in which such crime scene evidence is available, there are deep concerns with defendants’ actual ability to access DNA technology. Even if DNA evidence is accurate, it will not help defendants in capital cases if they do not have the right to demand testing. Defendants may plead guilty in an attempt to avoid a death sentence, but a guilty plea does not guarantee that a defendant in a capital case will be sentenced to life imprisonment.²⁶⁸ And after a defendant has been found

²⁶² See, e.g., SCHECK ET. AL., *supra* note 183, at 334 (remarking that there is only a “small handful of cases that happen to involve biological evidence”). See also Spencer S. Hsu, *Forensics Techniques are Subject to Human Bias, Lack Standards, Panel Found*, WASH. POST, Apr. 17, 2012, http://www.washingtonpost.com/local/crime/forensic-techniques-are-subject-to-human-bias-lack-standards-panel-found/2012/04/17/gIQADCoMPT_story.html (remarking that “[b]iological evidence historically is collected in fewer than 20 percent of criminal cases”).

²⁶³ See Raeder, *supra* note 14.

²⁶⁴ SCHECK ET. AL., *supra* note 183, at 281.

²⁶⁵ *Id.* at 285.

²⁶⁶ *Id.* at 286.

²⁶⁷ *Id.*

²⁶⁸ Teresa Lewis pled guilty to the murders of her husband and stepson. See John Grisham, *Why is Teresa Lewis on Death Row?*, THE CAP TIMES, Sept. 14, 2010, http://host.madison.com/ct/news/opinion/column/article_8a2d003b-d43e-5a7b-b967-

guilty, by jury or by plea, he has little recourse to compel the testing of even potentially exculpatory evidence.

Currently, post-conviction protections for prisoners, including those sentenced to death, are shockingly few. In 2009, the Supreme Court held that convicted prisoners do not have a constitutional right to post-conviction DNA testing.²⁶⁹ In addition, *Brady v. Maryland*, which held that prosecutors are required to give defense attorneys potentially exculpatory evidence, does not extend to the post-conviction context.²⁷⁰ In capital cases, the system relies on the use of pardons, sentence commutations, and other post-conviction mechanisms to ensure that innocents are not executed.²⁷¹ Inadequate appellate review means that defendants in capital cases are increasingly dependent upon the mercy of a parole board or governor. As Professor Victoria Palacios argues in *Faith in Fantasy*, “[b]y substituting the fantasy of commutation for meaningful appellate review, the Court has perpetuated a system in which capital convictions and sentences lack integrity, while capital defendants suffer injustice.”²⁷²

Forty-eight states have post-conviction DNA testing statutes, but many are substantially limited.²⁷³ According to Barry Scheck, “[f]ewer than half the states have statutes that give inmates time and money for post-conviction DNA testing,” even in spite of widespread public support for

2087755d0ee3.html. She was executed in 2010, despite the fact that she did not pull the trigger and in spite of evidence that she suffered from considerable intellectual impairment. *Id.* See also Ewen MacAskill, *Teresa Lewis Given Lethal Injection Despite Protests Over Low IQ*, GUARDIAN, Sept. 23, 2010, <http://www.guardian.co.uk/world/2010/sep/24/teresa-lewis-lethal-injection-virginia>.

²⁶⁹ Dist. Attorney’s Office for The Third Judicial Dist. v. Osborne, 557 U.S. 52, 69–70 (2009).

²⁷⁰ *Id.*

²⁷¹ Victoria J. Palacios, *Faith in Fantasy: The Supreme Court’s Reliance on Commutation to Ensure Justice in Death Penalty Cases*, 49 VAND. L. REV. 311 (1996).

²⁷² *Id.* at 312.

²⁷³ *Access to Post-Conviction DNA Testing*, INNOCENCE PROJECT, http://www.innocenceproject.org/Content/Access_To_PostConviction_DNA_Testing.php (last visited Oct. 10, 2012).

such a system.²⁷⁴ The result is that many prisoners, even those facing death, do not realistically have the ability to force potentially exculpatory evidence to be tested. The enormous problems with this system are readily apparent and call to mind the case of Claude Jones, discussed above.²⁷⁵ Jones, who maintained his innocence until the end, fought to have the only piece of physical evidence tying him to the crime tested for DNA.²⁷⁶ More than ten years after his execution, a crime lab finally tested the evidence and concluded that it was not a match to Jones.²⁷⁷

Unfortunately, Jones's case is not unique. Many prisoners have been denied the right to test potentially exculpatory DNA evidence. Ellis Wayne Felker, who was executed in Georgia in 1996, always maintained his innocence. Just a few weeks before his scheduled execution, the prosecution gave Felker's attorneys boxes of previously undisclosed evidence, some containing untested DNA samples.²⁷⁸ The court denied his attorneys' request to delay his execution in order to test the DNA.²⁷⁹ The request, made after a death warrant had been signed, had been filed too late; Felker was electrocuted.²⁸⁰ In 2000, a judge ruled that media outlets could pay to have the previously untested genetic material from the crime scene tested.²⁸¹ The results were inconclusive, neither clearing Felker's name nor proving his involvement.²⁸² Felker's case, like Claude Jones's, demonstrates the

²⁷⁴ SCHECK ET. AL., *supra* note 183, at 283.

²⁷⁵ *See supra* Section III.

²⁷⁶ Letter from Melton & Holland, *supra* note 204.

²⁷⁷ *Id.*

²⁷⁸ *The Death Penalty Worldwide: Developments in 2000*, AMNESTY INT'L, <http://www.amnesty.org/en/library/asset/ACT50/001/2001/en/c5cba0ac-dc25-11dd-9f41-2fdde0484b9c/act500012001en.html> (last visited Feb. 15, 2013) [hereinafter *The Death Penalty Worldwide*].

²⁷⁹ *Media to Pay for DNA Tests on Executed Man*, CHI. TRIB., July 27, 2000, http://articles.chicagotribune.com/2000-07-27/news/0007270383_1_dna-testing-ellis-wayne-felker-death-penalty.

²⁸⁰ *Id.*

²⁸¹ *Id.*

²⁸² *The Death Penalty Worldwide*, *supra* note 278.

huge difficulties death row inmates face when attempting to prove their innocence.

The problem of access to post-conviction testing of potentially exculpatory evidence is systemic and widespread. A *Frontline* special details four other cases in which defendants fought for the right to test DNA evidence.²⁸³ Currently, Thomas Arthur is on death row in Alabama for a crime he maintains he did not commit.²⁸⁴ While DNA evidence could prove his guilt or innocence conclusively, Alabama authorities have denied his request to have a wig worn by the killer tested, even though another man has confessed to the crime under oath.²⁸⁵ The court initially allowed Arthur to test the wig after learning of the other man's confession, but the results were inconclusive.²⁸⁶ However, even inconclusive results undermine the strength of a conviction. Despite the availability of more sophisticated DNA profiling tests and the offer by Arthur's attorneys to pay the cost of having the wig tested,²⁸⁷ Alabama courts have held firm in their refusal to allow the test.²⁸⁸ Without procedural rights to demand the testing of potentially exculpatory evidence, death row inmates face a difficult court battle to win the opportunity to demonstrate their innocence.

Even if DNA evidence is tested, though, courts might still refuse to overturn a conviction. Roy Criner was convicted of rape and murder in

²⁸³ *The Case for Innocence*, FRONTLINE, <http://www.pbs.org/wgbh/pages/frontline/shows/case/etc/synopsis.html> (last visited Oct. 10, 2012).

²⁸⁴ Andrew Rosenthal, *Death Penalty Death Watch: Is Alabama about to Execute an Innocent Man?*, N.Y. TIMES, Feb. 27, 2012, <http://loyalopposition.blogs.nytimes.com/2012/02/27/death-penalty-death-watch-is-alabama-about-to-execute-an-innocent-man/>.

²⁸⁵ *Id.*

²⁸⁶ Andrew Cohen, *Another Death Row Debacle: The Case against Thomas Arthur*, ATLANTIC, Feb. 27, 2012, <http://www.theatlantic.com/national/archive/2012/02/another-death-row-debacle-the-case-against-thomas-arthur/253608/>.

²⁸⁷ *Id.*

²⁸⁸ *Id.*

1990.²⁸⁹ Post-conviction testing proved that he could not have left the semen found on the victim, but the appellate court did not believe that this demonstrated his innocence.²⁹⁰ Criner was ultimately pardoned by the governor in 2000,²⁹¹ but his case indicates that even testing exculpatory evidence may not guarantee inmates justice. Once convicted, the defendant faces nearly insurmountable challenges to clearing his or her name.

IV. RECOMMENDATIONS TO MINIMIZE THE RISK OF FAULTY FORENSIC EVIDENCE LEADING TO EXECUTIONS OF INNOCENT DEFENDANTS

It is abundantly clear that the current system of admitting highly suspect forensic “science” at trials must change. This is especially important when it comes to capital cases; in no other area of the law are the stakes higher. Though it did not deal specifically with death penalty cases, the National Academy of Sciences Report offered several (rather controversial) suggestions to rectify the shoddy state of modern forensic analysis. In addition, I offer a suggestion of my own.

A. Federally Regulate Crime Labs

Congress should, as the National Academy of Sciences’ report urged,²⁹² create a federal administrative agency tasked with overseeing and implementing standardization among all crime labs nationwide. With inadequate supervision and oversight, crime labs right now are essentially unregulated. Individual states have the power to regulate their own labs, and some do,²⁹³ but there is no national accrediting or supervisory body to

²⁸⁹ *Know the Cases: Roy Criner*, INNOCENCE PROJECT, http://www.innocenceproject.org/Content/Roy_Criner.php (last visited Oct. 10, 2012).

²⁹⁰ *Id.*

²⁹¹ *Id.*

²⁹² NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 214.

²⁹³ For instance, Alabama has a Department of Forensic Sciences. ALA. DEP’T OF FORENSIC SCIENCES, <http://www.adfs.alabama.gov/> (last visited Oct. 12, 2012). Idaho

oversee crime labs and ensure that they follow standard procedures. In order to ensure uniform standards, the agency must be federal; state agencies are inadequate for the task. A federal agency with a degree of autonomy would, in theory, be more politically insulated than state-run agencies. The proposed National Institute of Forensic Sciences²⁹⁴ could be charged with developing and promulgating forensic standards, promoting research, allocating funding, and overseeing accreditation procedures for crime labs nationwide.²⁹⁵

State-run forensic agencies are subject to local politics. For example, the Texas Forensic Science Commission's investigative abilities were sharply curtailed as Governor Rick Perry prepared to enter the race for the 2012 Republican presidential nomination.²⁹⁶ Just two days before the commission was to hear testimony from a fire expert in their review of the Cameron Todd Willingham case, Governor Perry replaced three of its members; their replacements then stymied the investigation.²⁹⁷ Shortly thereafter, the Texas Attorney General issued an opinion limiting the commission's authority.²⁹⁸ While this itself is not evidence of a cover-up, one can certainly see how state agencies, particularly in states governed by those who aspire to higher office, might be subject to more political pressure than an independent federal agency.

With uniform procedures and a rigorous certification process, a new

has the Idaho State Police Forensic Services. IDAHO STATE POLICE, <http://www.isp.idaho.gov/forensic/index.html> (last visited Oct. 12, 2012). Montana has the Montana Department of Justice Forensic Science Center. MONT. DEP'T OF JUSTICE, <https://doj.mt.gov/crime/> (last visited Oct. 12, 2012). Texas has a Forensic Science Commission. TEX. FORENSIC SCI. COMM'N, <http://www.fsc.state.tx.us/> (last visited Oct. 12, 2012).

²⁹⁴ NAT'L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 214

²⁹⁵ *Id.*

²⁹⁶ Smith & Lavandera, *supra* note 178.

²⁹⁷ *Id.*

²⁹⁸ *Id.*

federal agency could ensure three significant benefits.²⁹⁹ First, any new requirements promulgated by the agency would force jurisdictions to update their procedures and methods, leading to more accurate results. Technicians would receive adequate training to ensure that they conducted tests properly and had been trained in the latest science. The agency could be charged with promulgating education standards for forensic analysts to ensure that gross incompetence of the type committed by Joyce Gilchrist would not lead to erroneous results.³⁰⁰ A continuing education requirement for forensic analysts could also be under this agency's purview. Such a requirement would guarantee that technicians adjust their tests to incorporate new and improved scientific advances and techniques.

Perhaps most importantly, a federal agency would have the resources and talent to conduct baseline probability studies to determine the reliability of current forensic techniques. It would not be particularly onerous, for instance, to design a study to finally determine how often certain ridge patterns occur in the fingerprints of a given population.³⁰¹ Moreover, if crime labs are beholden to a federal agency rather than a local police

²⁹⁹ The National Academy of Sciences lists three broad benefits:

The benefits that will flow from a strong, independent, strategic, coherent, and well-funded federal program to support and oversee the forensic science disciplines in this country are clear: The Nation will (1) bolster its ability to more accurately identify true perpetrators and exclude those who are falsely accused; (2) improve its ability to effectively respond to, attribute, and prosecute threats to homeland security; and (3) reduce the likelihood of convictions resting on inaccurate data. Moreover, establishing the scientific foundation of the forensic science disciplines, providing better education and training, and requiring certification and accreditation will position the forensic science community to take advantage of current and future scientific advances.

NAT'L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 20. I focus on three benefits specifically related to the reduced likelihood of convictions due to inaccurate techniques, which naturally flows from the third broad category of benefits named by the Academy.

³⁰⁰ See Deedrick, *supra* note 247.

³⁰¹ NAT'L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 21.

department, it stands to reason that their test results would avoid some potential bias.

Second, a national agency would encourage the sharing of new forensic techniques and methodologies among different jurisdictions. A central agency tasked with enforcing uniformity in forensic standards would foster improved results across all jurisdictions. Rather than operating autonomously, crime labs under federal jurisdiction would function under uniform standards, rendering results far more consistent.³⁰² Moreover, the national agency's efforts to improve the scientific justifications for forensic techniques and recruit trained scientists would likely foster new innovations in the field.

Third, a centralized agency would ensure that forensic standards were maintained even in poorer jurisdictions. With national standards to meet, defendants would logically face less risk of having the evidence tainted by incompetence or outdated technologies. Claude Jones, for instance, would not have been sentenced to death if the police had initially run the hair fragment found at the crime scene for DNA.³⁰³ Perversely, his execution partially resulted from the jurisdiction's lack of resources to test all of the evidence against him. Uniform federal standards would mean that certain jurisdictions could not use forensic methods that have been discredited by modern science or deny defendants access to testing procedures.

Creating a new federal agency to promulgate and enforce forensic standards is, however, highly controversial. Doing so would cost a considerable amount of money. The agency would have to fund research, analyze new equipment and techniques, develop and perform rigorous training for technicians, and perform site checks to ensure compliance. Crime labs in impoverished areas would have to be brought up to par, also

³⁰² According to the National Academy of Sciences, differences in how a test is conducted can lead to laboratory errors. *Id.* at 132.

³⁰³ *Interview with Mann, supra* note 219.

requiring an outlay of federal dollars.

B. Increase Forensics Education in Classrooms and in Courtrooms

In addition to a federal forensics agency, an increase in forensic education could greatly benefit the justice system. The 2006 Arson Review Committee report commissioned by the Innocence Project to examine the Willingham and Willis cases underscored the necessity of properly educating forensic technicians.³⁰⁴ “There is no crime other than homicide by arson for which a person can be sent to death row based on the unsupported opinion of someone who received all of his training ‘on the job.’”³⁰⁵ The report also concluded that the reason Ernest Ray Willis,³⁰⁶ a man who, like Willingham, was sentenced to death in Texas for arson, ultimately walked free while Willingham was executed was likely because Willis had the benefit of more effective counsel.³⁰⁷

The same Innocence Project report also highlights the need for prosecutors and defense attorneys to be educated about fire science.³⁰⁸ Ideally, the adversarial process would allow prosecutors and defense attorneys to argue about the merits of any forensic technique. In reality, though, legal professionals simply are unaware of the merits and vulnerabilities of various forensic methodologies, opting instead to accept

³⁰⁴ CARPENTER ET AL., *supra* note 171, at 42.

³⁰⁵ *Id.*

³⁰⁶ Ernest Ray Willis was convicted of the 1986 deaths of Elizabeth Belue and Gail Allison. *Id.* At Willis’s trial, experts testified that artifacts from the scene (irregular patterns on the floor, etc.) indicated an incendiary blaze. *Id.* at 21. The evidence against Willis was almost identical to the evidence against Willingham—the testimony of the various fire investigators involved with the cases are eerily similar. *Id.* at 13, 20. Willis was convicted and sentenced to death. He was housed in the same prison as Willingham. Willingham was executed in February 2004. *Id.* at 3. In October of the same year, Willis was set free. *Id.*

³⁰⁷ *Id.* at 42. After all, Willingham’s initial attorney only called a single witness to testify at his trial. Grann, *supra* note 127.

³⁰⁸ *Id.*

their legitimacy.³⁰⁹ As the National Academy of Sciences stated, “[l]awyers and judges often have insufficient training and background in scientific methods, and they often fail to fully comprehend the approaches employed by different forensic science disciplines and the strengths and vulnerabilities of forensic science offered during trials.”³¹⁰ Prosecutors should be trained to reject opinions not supported by laboratory findings; defense attorneys should be taught to consider whether evidence actually indicates that a crime has been committed.³¹¹

Poor attorney education has proved detrimental in fields other than forensic science. In March 2011, the Supreme Court ruled on a case that illustrates the necessity for continuing education. In *Connick v. Thompson*, the Court held that a district attorney’s office cannot be held liable for failing to properly train its employees where the wrongfully convicted plaintiff can only prove one violation of *Brady v. Maryland*.³¹² John Thompson spent fourteen years on death row in Louisiana, but all the while prosecutors had a blood test demonstrating his innocence on one of the charges against him.³¹³ After his eventual release, he sued prosecutors and was awarded damages of \$14 million.³¹⁴ On appeal, government officials argued that a district attorney has no obligation to ensure the education of his staff members.³¹⁵ The Court agreed.³¹⁶

If practitioners are under no obligation to keep informed about the changing contours of the field in which they specialize, there is little hope

³⁰⁹ See NAT’L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21, at 238.

³¹⁰ *Id.*

³¹¹ CARPENTER ET AL., *supra* note 171, at 41.

³¹² *Connick v. Thompson*, 131 S. Ct. 1350, 1358 (2011).

³¹³ Robert Barnes, *Supreme Court Rules against Exonerated Death Row Inmate Who Sued Prosecutors*, WASH. POST, Mar. 29, 2011, http://www.washingtonpost.com/politics/supreme-court-rules-against-exonerated-death-row-inmate-who-sued-prosecutors/2011/03/29/AF8tZPwB_story.html.

³¹⁴ *Id.*

³¹⁵ *Id.*

³¹⁶ *Connick*, 131 S.Ct. at 1358.

that attorneys will actually educate themselves about the finer points of forensic analysis. But a mandated education program would solve this problem. The Court has acknowledged that capital cases demand certain enhanced procedural protections: “In capital cases the finality of the sentence imposed warrants protections that may or may not be required in other cases.”³¹⁷ It would not be unreasonable to require attorneys working on such important cases to be informed about the scientific underpinnings of evidence offered in capital trials. The proposed federal forensics agency could develop a curriculum used during continuing legal education courses, for instance, or perhaps a continuing forensics education requirement could be a condition of a lawyer’s acceptance of a capital case. The current system of parading experts upon experts does not work—lawyers, let alone lay members of the jury, do not have the scientific background necessary to determine the veracity of any scientific method.

C. Abolish the Death Penalty

The simplest and most foolproof solution, of course, would be to abolish the death penalty. Even setting aside serious concerns about its astronomical cost, systematically racist and sexist application, ineffectiveness in discouraging violent crime, and implications for international human rights and the dignity of human life, abolishing capital punishment would ensure that no person is executed on the basis of unsubstantiated pseudo-science. For every eight people executed in the United States, “one innocent person is freed, not only from death row but from incarceration.”³¹⁸ This figure should give us pause. What is an acceptable death penalty error rate? Is it even possible to have one? As Blackstone said, “it is better that ten guilty

³¹⁷ *Ake v. Oklahoma*, 470 U.S. 68, 87 (1985) (Burger, J., concurring).

³¹⁸ SCHECK ET. AL., *supra* note 183, at 282. Freedom from incarceration implies that these former death row inmates were exonerated, meaning that no doubt remains about their innocence. This figure does not include individuals whose sentences were commuted.

persons escape, than that one innocent suffer.”³¹⁹

Abolishing capital punishment, though, is not without its difficulties. Capital punishment is supported by a majority of the country.³²⁰ In many jurisdictions, the death penalty is so ingrained that any attempts to abolish it would be met with fierce resistance. States like Texas, Florida, Virginia, and Georgia have, in a sense, a culture of the death penalty.³²¹ Politicians use it as a way to demonstrate that they are tough on crime.³²² Because of this, the states that retain the death penalty are unlikely to abolish it of their own accord. The most likely candidate, then, to bring about the nationwide abolition of capital punishment would be the Supreme Court. The Court could, in theory, simply adopt the rationale from Justices Brennan and Marshall’s passionate dissents in death penalty cases.³²³ The Court could

³¹⁹ 4 BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND 358 (3rd ed. 1884).

³²⁰ *Continued Majority Support for the Death Penalty: More Concern among Opponents about Wrongful Convictions*, PEW RESEARCH CTR. (Jan. 6, 2012), <http://www.people-press.org/2012/01/06/continued-majority-support-for-death-penalty/1/>.

³²¹ See Andrew Tilghman, *Poll: Support for the Death Penalty Remains High*, HOUSTON CHRON., Nov. 13, 2004, <http://www.chron.com/news/houston-texas/article/Poll-Support-for-the-death-penalty-remains-high-1954925.php> (stating that three quarters of Texans supported capital punishment, a significantly higher percentage than the nation as a whole).

³²² See, e.g., Stephen B. Bright, *Advocate in Residence: The Death Penalty as the Answer to Crime: Costly, Counterproductive and Corrupting*, 36 SANTA CLARA L. REV. 1069 (1996).

I appreciate the opportunity to make some remarks about capital punishment and about the crime debate in our country today. Unfortunately, what is called a crime debate is really no debate at all, but an unseemly competition among politicians to show how tough they are on crime by supporting harsher penalties and less due process.

Id. Bright also speaks about the execution of Ricky Rector, a man with mental challenges so profound that he saved the dessert from his last meal for later. *Id.* at 1071. Bright argues that during the 1992 Democratic primaries, then-Governor Clinton returned to Arkansas to oversee Rector’s execution to demonstrate his tough stance on crime. *Id.*

³²³ See, e.g., *McCleskey v. Kemp*, 481 U.S. 279, 320 (1987) (Brennan, J., dissenting); *Stanford v. Kentucky*, 492 U.S. 361, 382 (1989) (Brennan, J., dissenting), *overruled by* *Roper v. Simmons*, 543 U.S. 551 (2005).

hold that all executions are unconstitutional because they violate the Eighth and Fourteenth Amendments.³²⁴ With no death penalty, the chance of an innocent person being executed drops to zero.

Ending the death penalty would prevent any risk of erroneous executions, but it would not diminish the need for increased post-conviction discovery. While a criminal justice system operating without death sentences would have fewer time constraints in terms of the finality of the punishment, convicted defendants should have the rights and funding procedures necessary to compel the testing of potentially exculpatory evidence. While abolishing capital punishment eliminates any risk of executing an innocent, it does not entirely address the risks of questionable scientific evidence in the courtroom.

V. CONCLUSION

Today's jurors are eager for forensic evidence, a phenomenon sometimes called the "CSI effect," and jurors expect to see forensic evidence in any criminal case.³²⁵ The incredibly weak foundations of modern forensic science techniques, when coupled with the deeply flawed system of capital punishment in this country, interact to form a dysfunctional and troubling relationship. "Simply put, we have a broken system (the forensic science system) attempting to support another broken system (the death penalty system)."³²⁶

It is difficult to imagine that innocent people have not been put to death. DNA evidence has exonerated over three hundred men, eighteen of whom had been sentenced to die for crimes they did not commit.³²⁷ But since DNA

³²⁴ A discussion of the merits of this argument is the topic of another article entirely. The point is simply that the Court *could* act in this way.

³²⁵ Craig M. Cooley, *Reforming the Forensic Science Community to Avert the Ultimate Injustice*, 15 STAN. L. & POL'Y REV. 381, 386–87 (2004).

³²⁶ *Id.*

³²⁷ *Innocence Project Case Profiles*, *supra* note 220.

evidence is only available in a small fraction of crimes,³²⁸ its exculpatory value is limited to cases in which the actual killer left testable genetic material. Other forensic techniques are used, most of which have only the most tenuous of relationships with actual science.³²⁹ Evidence suggests that incorrect understandings of arson investigation and microscopic hair comparisons may have led to the executions of two innocent men in Texas.³³⁰ Willingham and Jones have had the posthumous benefit of media coverage;³³¹ other executed prisoners, like Felker, have not been quite so lucky.

Sweeping and dramatic changes are necessary in order to ensure that innocent people are not executed. While there is no definitive proof that an innocent person has in fact been executed, there are several cases that strongly suggest that the greatest miscarriage of justice possible has been carried out. Crime labs purporting to engage in scientific analysis must be regulated, and it must be done by an independent federal agency. Only an independent federal agency can sufficiently insulate the testing procedures from political pressure, thereby maintaining the objectivity necessary to maintain accurate results.

Considering the deep problems associated with the death penalty, the simplest way to ensure that no innocent person is executed on the basis of junk science is to abolish capital punishment altogether. Without the considerable time constraints imposed by a death sentence, appellate courts would have more time to consider the reliability of forensic evidence

³²⁸ See, e.g., SCHECK ET. AL., *supra* note 183, at 334.

³²⁹ See, e.g., NAT'L RESEARCH COUNCIL, STRENGTHENING, *supra* note 21.

³³⁰ See *supra* Section III.

³³¹ See, e.g., Ed Pilkington, *Troy Davis Execution, One Year On: 'We Want to Stop the Killing of Innocent Men'*, GUARDIAN, Sept. 21, 2012, <http://www.guardian.co.uk/world/2012/sep/21/troy-davis-execution-one-year>; Michael McLaughlin, *Cameron Todd Willingham Exoneration was Written but Never Filed by Texas Judge*, HUFFINGTON POST, May 21, 2012, http://www.huffingtonpost.com/2012/05/19/cameron-todd-willingham-exoneration_n_1524868.html.

presented at trial or to consider new evidence post-conviction.

In 2006, Justice Scalia wrote that there was not a single case “in which it is clear that a person was executed for a crime he did not commit. If such an event had occurred in recent years, we would not have to hunt for it; the innocent’s name would be shouted from the rooftops.”³³² The very nature of forensic evidence, as a field relegated to experts and inaccessible to laymen, has not afforded the public opportunities to critically examine the validity of forensic techniques. Perhaps, with increased publicity and standardized procedures, forensic technicians whose work is suspect will have to answer to the public. Perhaps then people will start shouting.

³³² *Kansas v. Marsh*, 548 U.S. 163, 188 (2006) (Scalia, J., concurring).