

REFORMING THE FORENSIC SCIENCE COMMUNITY TO AVERT THE ULTIMATE INJUSTICE

Craig M. Cooley*

No less dangerous are the mistakes of [forensic] expert witnesses. Blind confidence of the courts in the authority of expert witnesses is responsible for many a wrongful conviction.¹

In order to preserve the integrity of the criminal justice system . . . particularly in the face of rising nationwide criticism of forensic evidence in general . . . state courts . . . must . . . cull scientific fiction and junk science from fact.²

It seems that the only standard the courts are requiring of forensic science is that it be incriminating to the defendant.³

* Investigator, Office of the Appellate State Defender (Illinois), Death Penalty Trial Assistance Division. J.D. candidate (2004), Northwestern University School of Law; M.S. (Forensic Science), University of New Haven; B.S. (Psychology), University of Pittsburgh. After graduation, Mr. Cooley will be clerking for Justice Jon P. Wilcox of the Wisconsin Supreme Court for the 2004-05 term. *Stanford Law & Policy Review* editors deserve much recognition for all their hard work. This Article is that much better because of their grammatical insights and edits. I would like to thank my good friend, colleague, and Scientific Evidence Professor Edward Cheng for his editorial comments, ideas, and insights. Mr. Cheng is currently an Assistant Professor of Law at Brooklyn Law School. Likewise, much appreciation must be given to Brent Turvey for assisting me in identifying cases that have been negatively impacted by imprecise science and forensic fraud. Mr. Turvey's website, like mine, houses much of our research (http://www.corpusdelicti.com/prof_archives.html). Northwestern Law Professors Ronald Allen, Larry Marshall, and Rob Warden also deserve recognition. Portions of this Article were written for Professor Allen's Advanced Criminal Procedure and Evidence seminar and Professors Marshall and Warden's Wrongful Convictions seminar. Lastly, this Article is dedicated to all the investigators working within the Capital Litigation Division and Death Penalty Trial Assistance Division—namely, Jon, Eddie, Fred, Mike, Dean, and Don—and to all the great attorneys I have been fortunate enough to work with and learn from over the past four years—specifically, Northwestern Law Professors Thomas Geraghty and Cathryn Stewart Crawford, DePaul Law Professor Andrea Lyon, and the DPTA attorneys, Steve Richards, Mark Lyon, Tom Cosgrove, and Allen Sincox. Mr. Cooley can be contacted via email, law_forensic@yahoo.com, or through his website, <http://www.law-forensic.com>.

¹ Max Hirschberg, *Wrongful Convictions*, 13 ROCKY MTN. L. REV. 20, 33 (1940).

² Ramirez v. State, 810 So. 2d 836, 853 (Fla. 2001).

I'm sorry for your wrongful conviction. As you know, the science of today is not the science of yesterday.⁴

I do not believe that Officer Ganda's three-week training course in New York qualified him as an expert in blood spattering.⁵

Whether it was intentional or just negligence, the fact is that [Joyce Gilchrist's] testimony was used to secure death sentences in cases where these people might have been sentenced to life. . . . If just one of these people would have been sentenced to life without her testimony, the entire criminal justice system has been undermined.⁶

[Firearms examiners are] basically caught with [their] pants down, to tell you the truth. We're all scrambling to address these [comparative bullet lead analysis] issues.⁷

I. CAPITAL PUNISHMENT'S UGLY REALITY: A SYSTEM IN DESPAIR

I cannot support a system, which, in its administration, has proven to be so fraught with error and has come so close to the ultimate nightmare, the state's taking of innocent life.⁸

Not since the Supreme Court's decision in *Furman v. Georgia*⁹ has the American public been so captivated by, yet critical of, the life and death issues raised by capital punishment.¹⁰ The increased attention directed toward the

³ THOMAS FRISBIE & RANDY GARRET, VICTIMS OF JUSTICE 56 (1998) (quoting John Marshall Law School Professor, Melvin B. Lewis).

⁴ Peter Shinkle, *Man Cleared by DNA Tests Is Freed After 17 Years*, ST. LOUIS POST-DISPATCH, Aug. 26, 2003, at A1 (quoting Circuit Judge Jimmie Edwards' apology to Lonnie Erby, who spent seventeen years in prison for a rape he did not commit).

⁵ *People v. Knox*, 459 N.E.2d 1077, 1082 (Ill. App. Ct. 1984) (Stouder, J., dissenting); see also Adam Liptak, *You Think DNA Evidence Is Foolproof? Try Again*, N.Y. TIMES, Mar. 16, 2003, at A5 ("So many of the people who give DNA testimony . . . went to two weeks of training by the F.B.I. in Quantico . . . and they are miraculously transformed from beat policemen into forensic scientists." (quoting Stephen B. Bright, the director of the Southern Center for Human Rights)).

⁶ Lois Romano, *Police Chemist's Missteps Cause Oklahoma Scandal*, WASH. POST, Nov. 26, 2001, at A01.

⁷ Nell Boyce, *Do Bullets Tell Tales?*, U.S. NEWS & WORLD REP., Nov. 24, 2003, at 60 (quoting Sacramento County crime lab firearms examiner Bruce Moran). The recent issues concerning comparative bullet lead analysis will be discussed *infra* notes 298-306 and accompanying text.

⁸ Alan Berlow, *Death in Texas; The Capital of Capital Punishment Should Heed Illinois's Example*, WASH. POST, Feb. 13, 2000, at B05 (quoting then-Illinois Governor George Ryan).

⁹ 408 U.S. 238 (1972) (holding that arbitrary and capricious death sentences violate the Eighth Amendment).

¹⁰ See Russ Feingold, *The Death Penalty Under Attack*, 16 CRIM. JUST. 18 (2001) (noting the increased scrutiny and criticism directed toward capital punishment); John Cloud, *Guarding Death's Door; The Death Penalty Is Under Attack*, TIME, July 14, 2003, at 46 (same).

capital punishment system can be directly attributed to its pitiable state.¹¹ The capital punishment systems operating throughout the United States seldom operate in an efficient and fundamentally fair manner given that death sentences are frequently overturned for various constitutional reasons.¹² Moreover, racial and socioeconomic characteristics of death row inmates have raised questions about whether the capital system is truly economically and racially blind.¹³ Legal scholars and investigative reporters have repeatedly highlighted the system's failings.¹⁴ Simply put, the United States capital punishment system is flat-out broken.¹⁵ The system is so out of order that 113 death row inmates have been exonerated since 1973.¹⁶

Nowhere has the death penalty system's dysfunctional nature been more evident than in Illinois.¹⁷ By now, thanks to former Illinois Governor George Ryan, the American public, if not the world, understands the injustices meted out by Illinois' capital punishment system. On January 10, 2003, two days

¹¹ As Senator Russ Feingold notes, "More and more . . . [w]e see growing numbers of innocent people exonerated. We see mounting evidence that states apply the ultimate penalty in an unequal manner." Feingold, *supra* note 10, at 19.

¹² In one recent study, researchers discovered that capital sentences were seven to fourteen times more likely to be reversed than noncapital sanctions. See James S. Liebman et al., *Capital Attrition: Error Rates in Capital Cases, 1973-1995*, 78 TEX. L. REV. 1839 (2000); James S. Liebman et al., *A Broken System, Part II: Why There Is So Much Error in Capital Cases, and What Can Be Done About It* § II.A (2002), at <http://www2.law.columbia.edu/brokensystem2/index2.html>. Currently, thirty-eight states have the death penalty. See DEATH PENALTY INFO. CTR., FACT SHEET, at <http://www.deathpenaltyinfo.org/FactSheet.pdf> (last visited Feb. 8, 2004).

¹³ See VIRGINIA GENERAL ASSEMBLY, JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION, REVIEW OF VIRGINIA'S SYSTEM OF CAPITAL PUNISHMENT (2001), <http://jlarc.state.va.us/Meetings/December01/capital.pdf> (finding that the death penalty in Virginia is applied more often in rural and suburban jurisdictions than in urban ones, even when the underlying crimes are similar); David C. Baldus et al., *Reflections on the "Inevitability" of Racial Discrimination in Capital Sentencing and the "Impossibility" of Its Prevention, Detection, and Correction*, 51 WASH. & LEE L. REV. 357 (1994) (discussing racial disparities in capital punishment).

¹⁴ See, e.g., Ken Armstrong & Steve Mills, *Failure of the Death Penalty in Illinois*, CHI. TRIB., Nov. 14-18, 1999 (five-part series detailing the problems associated with Illinois' capital punishment system); Taylor Bright & Jeb Phillips, *Execution of Justice*, BIRMINGHAM POST-HERALD, Dec. 14-18, 2001 (five-part series outlining the inadequacies of Alabama's capital punishment system); *State of Execution*, CHI. TRIB., June 11-12, 2000 (two-part series describing problems associated with Texas's capital punishment system).

¹⁵ See Louis Freedberg, *Death Row Exposed*, S.F. CHRON., July 27, 2003, at D4 ("The crux of the problem is that the death penalty system is broken.").

¹⁶ See DEATH PENALTY INFO. CTR., *supra* note 12. Alan Gell is the latest to be freed. Gell secured his freedom on February 18, 2004 when he was found not-guilty at his retrial. Gell had spent nine years behind bars, four of which were spent on North Carolina's death row. See Joseph Neff, *Gell Found Not Guilty*, NEWS & OBSERVER (Raleigh, N.C.), Feb. 19, 2004, at A1.

¹⁷ Illinois' capital punishment system was so dysfunctional that Governor Ryan chose to halt all executions in Illinois in January 2000. See Ken Armstrong & Steve Mills, *Ryan: "Until I Can Be Sure"; Illinois Is the First State to Suspend Death Penalty*, CHI. TRIB., Feb. 1, 2000, at 1.

before his final day in office, Ryan sent shock waves around the world when he pardoned Madison Hobley,¹⁸ Leroy Orange,¹⁹ Aaron Patterson, and Stanley Howard.²⁰ Following his unprecedented pardon decisions at DePaul University's College of Law, Ryan imbedded himself into the history books the very next day at Northwestern University's School of Law when he commuted the death sentences of all death row inmates to life in prison.²¹ Governor Ryan, like the late United States Supreme Court Justice Harry Blackmun, chose "no longer . . . [to] tinker with the machinery of death."²²

The totality of Governor Ryan's decisions over the past three years may have single-handedly revitalized the moratorium movement in many states.²³ Moreover, Governor Ryan's decisions have shattered the walls of silence that once characterized the judiciary's stance toward capital punishment. State, federal, and even United States Supreme Court Justices are now finally expressing their apprehension toward the death penalty system.²⁴ Politicians

¹⁸ As a law student, the author assisted Madison Hobley's attorneys, Andrea Lyon and Kurt Feuer, at DePaul University's Center for Justice in Capital Cases.

¹⁹ The author, through his investigative position with the Death Penalty Trial Assistance Division, provided investigative assistance to Thomas Geraghty, Cathryn Stewart Crawford, and Northwestern University's Legal Clinic with respect to Leroy Orange's case.

²⁰ See Steve Mills & Maurice Possley, *Ryan to Pardon 4 on Death Row; Men Say They Were Tortured by Chicago Police*, CHI. TRIB., Jan. 10, 2003, at 1 [hereinafter *Ryan to Pardon*]. According to Governor Ryan, these cases were "perfect examples of what is so terribly broken about our system," in that they "repeatedly cried out for justice, and their cries [fell] on deaf ears." *Excerpts from Gov. Ryan's Speech*, CHI. TRIB., Jan. 11, 2003, at 18.

²¹ See Maurice Possley & Steve Mills, *Clemency for All*, CHI. TRIB., Jan. 12, 2003, at 1; Governor George Ryan, Commutation Announcement at Northwestern University School of Law (Jan. 11, 2003) (transcript available at <http://www.law.northwestern.edu/depts/clinic/wrongful/RyanSpeech.htm>).

²² *Callins v. Collins*, 510 U.S. 1141, 1145 (1994) (emphasis added) (Blackmun, J., dissenting).

²³ See, e.g., Jeffrey L. Kirchmeier, *Another Place Beyond Here: The Death Penalty Moratorium Movement in the United States*, 73 U. COLO. L. REV. 1 (2002) (discussing the current moratorium movement); Michael L. Radelet, *More Trend Toward Moratoria On Executions*, 33 CONN. L. REV. 845 (2001) (same).

²⁴ For example, Supreme Court Justice Ruth Bader Ginsburg took the unparalleled measure of supporting a moratorium on executions, stating that she has "yet to see a death penalty case among the dozens coming to the Supreme Court on eve-of-execution stay applications in which the defendant was well-represented at trial." Ruth Bader Ginsburg, *In Pursuit of the Public Good: Access to Justice in the United States*, 7 WASH. U. J.L. & POL'Y 1, 10 (2001). Soon thereafter, Justice Sandra Day O'Connor, a long-time capital punishment advocate, commented, "If statistics are any indication, the system may well be allowing some innocent defendants to be executed." Ken Armstrong & Steve Mills, *O'Connor Questions Fairness of Death Penalty; Justice Rethinking Laws She Shaped*, CHI. TRIB., July 4, 2001, at 1. With respect to federal judges, United States District Court Judge Mark L. Wolf recently acknowledged, like his brethren District Court Judge Jed S. Rakoff, that applying the federal death penalty will inescapably lead to an innocent person's execution. See Kathleen Burge & Andrea Estes, *US Judge Rejects Sampson's Challenge; Upholds Death Penalty Law in the Murder Suspect's Case*, BOSTON GLOBE, Aug. 12, 2003, at B1. In July 2002, Federal District Judge Jed S. Rakoff held that the 1994 Federal Death Penalty Act was unconstitutional. According to Judge Rakoff, "the Federal Death Penalty Act, by cutting off the opportunity

have also exhibited signs of change with respect to capital punishment's administration.²⁵

Considering the death penalty system's questionable record of only sentencing the guilty to death,²⁶ the current trend toward moratoria, the substantial drop in support for the death penalty over the last decade,²⁷ and the fact that an increasing number of juries are choosing life over death,²⁸ the Supreme Court has literally been forced to reconsider whether its capital punishment jurisprudence requires major renovation. Consequently, for a Court that spent years accelerating the death process, the past three terms have been noteworthy because the Court's death penalty rulings appear to be decelerating the death process.²⁹ The 2004-2005 term may also significantly alter capital punishment's contours, as the Court recently granted certiorari in *Roper v. Simmons*³⁰ to decide whether executing "a person who commits a murder at age

for exoneration, denies due process and, indeed, is tantamount to foreseeable, state-sponsored murder of innocent human beings." *United States v. Quinones*, 205 F. Supp. 2d 256, 268 (S.D.N.Y. 2002). Judge Rakoff's ruling was overturned by the Second Circuit Court of Appeals. *United States v. Quinones*, 317 F.3d 86 (2d Cir. 2003).

²⁵ See Tom Beyerlein, *Clemency Brings Death Row Inmate Relief*, DAYTON DAILY NEWS, July 2, 2003, at A1 (noting that the Ohio Governor granted clemency to Jerome Campbell, who was scheduled to be executed on June 27, 2003); Henry Weinstein, *Death Sentence Commuted for Kentucky Man Who Killed at 17*, L.A. TIMES, June 22, 2003, at 36 (discussing the Kentucky Governor's decision to commute Kevin Stanford's death sentence). Kevin Stanford's death sentence was held constitutional in *Stanford v. Kentucky*, in which the Supreme Court refused to hold that executing an individual who committed his or her crime as a juvenile (older than sixteen but younger than eighteen) violated the Eighth Amendment's Cruel and Unusual Punishment Clause. 492 U.S. 361 (1989).

²⁶ See Hugo Adam Bedau & Michael L. Radelet, *Miscarriages of Justice in Potentially Capital Cases*, 40 STAN. L. REV. 21 (1987).

²⁷ Gallup polls have shown a drop in support for the death penalty from 80% in 1994 to 65% in 2000. See Julie Cart, *Impending Execution Trends*, L.A. TIMES, Nov. 4, 2001, at A29.

²⁸ See, e.g., Alex Kotlowitz, *In the Face of Death*, N.Y. TIMES, July 6, 2003, at A32 (noting that jurors are not voting for death as frequently); Adam Liptak, *Juries Reject Death Penalty In Nearly All Federal Trials*, N.Y. TIMES, June 15, 2003, at A12.

²⁹ See, e.g., *Banks v. Dretke*, 124 S. Ct. 1256, 1263 (2004) (overturning a death sentence because "police or prosecutors conceal[ed] significant exculpatory or impeaching material in the State's possession"); *Wiggins v. Smith*, 123 S. Ct. 2527 (2003) (finding petitioner's death sentence unconstitutional because counsel's penalty phase representation fell below professional norms); *Miller-El v. Cockrell*, 537 U.S. 322 (2003) (holding that a capital defendant should have been afforded an opportunity to present evidence of racial bias during his federal appeal); *Atkins v. Virginia*, 536 U.S. 304 (2002) (holding that executing the mentally retarded violates the Eighth Amendment); *Ring v. Arizona*, 536 U.S. 584 (2002) (holding unconstitutional state death penalty laws that permit trial judges, rather than juries, to decide whether death should be imposed). *Ring* has already had a significant impact. In September 2003, the Ninth Circuit Court of Appeals overturned more than one hundred death sentences handed down by judges instead of juries. See *Summerlin v. Stewart*, 341 F.3d 1082 (9th Cir. 2003); see also Michael Rowan, *Minding Out Skepticism: A Conservative Approach to Capital Punishment*, 31 FLA. ST. U. L. REV. 377, 379 (noting that, while capital punishment has faced no real constitutional threats since *Furman*, "chinks in the armor of capital punishment have begun to show").

³⁰ 112 S.W.3d 397 (Mo. 2003), cert. granted, 124 S. Ct. 1171 (2004). For more on *Roper*,

seventeen [is] ‘cruel and unusual,’ and thus barred by the Eighth and Fourteenth Amendments.”³¹

Given the increased awareness regarding the death penalty system’s fallibility, legal and political activists have articulated various reforms.³² These modifications would, according to the reformers, rehabilitate the death penalty process so that factually erroneous and constitutionally infirm convictions would be greatly diminished, if not entirely eliminated.³³

Capital punishment’s landscape is clearly changing for the better. Nonetheless, this transformation will be considered incomplete if it fails to include one of the pillars of the capital punishment system—the forensic science community. The discovery of truth in capital (and noncapital) cases has increasingly rested on the forensic science community’s shoulders.³⁴ If forensic evidence is not objectively tested, analyzed, and interpreted by adequately trained forensic scientists, unearthing the truth will be potentially compromised, if not altogether impossible. In capital cases this can be devastating given that a grizzly killer may walk free or an innocent person may be sentenced to death. Especially in today’s world, where “jurors are really

see Tony Mauro, *Teen Executions to be Reviewed by High Court*, NAT’L L.J., Feb. 2, 2004, at 7.

³¹ Reply to Brief in Opposition to Petition for Writ of Certiorari at i, *Roper v. Simmons*, 112 S.W.3d 397 (Mo. 2003) (No. 03-633), available at 2004 WL 50134.

³² The suggested reforms include: elevating the professional standards for capital attorneys, see Jerry Crimmins, *Few Jumping Through Hoops To Join Capital Case Bar*, CHI. DAILY L. BULL., July 24, 2001, at 1 (discussing Illinois’ new capital litigation bar); enlightening judges on the substantive and procedural law of capital punishment, see Jerry Crimmins, *Judges Set To Fulfill Duty for Capital Litigation*, CHI. DAILY L. BULL., May 20, 2003, at 1; developing capital defense units, see Jeremy P. White, *Establishing A Capital Defense Unit in Virginia: A Proposal To Increase the Quality of Representation for Indigent Capital Defendants*, 13 CAP. DEF. J. 323 (2001); ensuring capital defendants are afforded mitigation specialists, see Craig M. Cooley, *Mapping the Monster’s Mental Health and Social History: Why Capital Defense Attorneys and Public Defender Death Penalty Units Require the Services of Mitigation Specialists*, 29 OKLA. CITY U. L. REV. (forthcoming 2004); excluding death in the presence of lingering doubt, see Margery Malkin Koosed, *Averting Mistaken Executions by Adopting the Model Penal Code’s Exclusion of Death in the Presence of Lingering Doubt*, 21 N. ILL. U. L. REV. 41 (2001); and limiting capital punishment to cases where guilt is demonstrated to an “actual certainty” and not just “beyond a reasonable doubt,” see Cheyenne Hopkins, *Keating Proposes Death Penalty Standard*, DAILY OKLAHOMAN, June 23, 2001.

³³ For instance, Governor Ryan’s Death Penalty Commission Report stated that if all eighty-five recommendations were implemented, they would “enhance significantly the fairness, justice and accuracy of capital punishment in Illinois.” REPORT OF THE GOVERNOR’S COMMISSION ON CAPITAL PUNISHMENT, at i (2002).

³⁴ According to recent congressional testimony, “[A]pproximately 75 percent of all cases in the criminal justice system are touched by forensic science evidence analysis. Without this service, our criminal justice system would effectively come to a halt.” *Funding Forensic Sciences; DNA and Beyond: Hearing Before the Senate Judiciary Comm., Subcomm. on Administrative Oversight and the Courts*, 108th Cong (2003) (statement of Randall Hillman, Executive Director, Alabama District Attorneys Association), available at 2003 WL 56336513.

looking for forensic evidence”³⁵ because of the “CSI effect,”³⁶ lives can and will be irrevocably impacted by forensic evidence.³⁷ This impact may well be more profound in capital cases given that “death-qualified”³⁸ jurors may view forensic evidence more favorably than non-death-qualified jurors.³⁹

Consequently, before the capital punishment system can be completely transformed and rehabilitated, the forensic science community must first be able to establish its efficiency, proficiency, and integrity. Unfortunately, as this Article will expose, the forensic science community is having difficulty establishing its competence and proficiency. For the most part, the forensic science community is in a perpetual state of disarray not only because it keeps stumbling over its own arrogance but also because it has never been properly funded. Simply put, we have a broken system (the forensic science system) attempting to support another broken system (the death penalty system). With this in mind, if the criminal justice system wishes not to execute innocent individuals, the forensic science community’s structural, regulatory, and economic shortcomings must be addressed and rectified.

This Article’s primary objective will be to articulate a nonexhaustive set of forensic science reforms. The reforms are aimed at enhancing the forensic science community’s legitimacy and accuracy, thereby minimizing, to the greatest extent possible, the likelihood that forensic science will lead to a factually innocent person’s wrongful conviction and worse yet his unjustifiable execution. Part II highlights the untold truths about the forensic community and its practitioners—namely that (1) forensic evaluations and conclusions are not always correct, and (2) forensic practitioners are not always ethical and objective scientists. Once these realities are exposed, Part III sets out to articulate the reforms.

³⁵ Ken Ross, *Crime Labs Become Basic Tool*, SPRINGFIELD UNION-NEWS, May 4, 2003, at A01 (quoting Springfield, Massachusetts Police Chief, Paula C. Meara).

³⁶ The “CSI effect” is “a phenomenon in which actual investigations are driven by the expectations of the millions of people who watch fake whodunits on TV. It has contributed to jurors’ desire to see more forensic testimony from the stand.” Carlene Hempel, *TV’s Whodunit Effect Police Dramas Are Having An Unexpected Impact in the Real World*, BOSTON GLOBE, Feb. 9, 2003, at 13.

³⁷ See Randolph N. Jonakait, *Stories, Forensic Science, and Improved Verdicts*, 13 CARDOZO L. REV. 343, 345 (1991).

³⁸ A “jury is considered ‘death-qualified’ once death penalty-opposed jurors are excluded.” Alyssa Lareau & Grant Willis, *Capital Punishment*, 90 GEO. L.J. 1838, 1967–68 (2002) (citing *Lockhart v. McCree*, 476 U.S. 162, 166–67 (1986)).

³⁹ See Craig M. Cooley, *Forensic Individualization Sciences and the Capital Jury: Are Witherspoon Jurors More Deferential to Suspect Science than Non-Witherspoon Jurors?*, 28 S. ILL. U. L.J. (forthcoming 2004) (finding minimal support for the hypothesis that death-qualified jurors are more deferential toward forensic evidence than non-death-qualified jurors).

II. WRONGFUL CONVICTIONS AND FORENSIC SCIENCE: THE DARK SIDE OF FORENSIC SCIENCE HOLLYWOOD WISHES NOT TO SHOW

[While] [e]veryone connected with the justice system expects forensic science to be infallible . . . [i]t is not.⁴⁰

During the summer of 2002, I received a phone call from one of the writers of CBS's television show *CSI*. The phone call took place shortly after Samantha Runnion's kidnapping and murder.⁴¹ The writer informed me that the *CSI* producers were interested in writing a show involving forensic science and the death penalty. The producers had a script in mind where forensic scientists would assist prosecutors in ultimately securing a death sentence for a would-be capital defendant who allegedly committed a grizzly murder. After hearing the suggested script, I abruptly informed the writer that forensic evidence is often ambiguous and can only act as an exclusionary tool in many investigations, especially if biological evidence was not discarded at the crime scene. Moreover, I emphasized that many forensic determinations are simply subjective human endeavors that can be easily preyed upon by unconscious or conscious influences and biases. These biases, I stressed, can lead to wrongful convictions and missed opportunities of justice. Furthermore, I questioned whether the producers were actually aware of the fact that it only takes a Bachelor of Science degree in biology or chemistry to be considered a forensic scientist. After informing the writer of other forensic evidence limitations, I suggested an alternative script, one that would leave viewers questioning whether prosecutors convicted and sentenced to death the true offender. I proposed that the script highlight not only the many benefits of forensic evidence but also the various dangers involved in relying too heavily on such evidence, especially in a capital trial. Needless to say, neither the writer nor the producers wanted anything to do with such a script.

The point is that the American public, if not the world, is being perpetually inundated with distorted perceptions of forensic science's capabilities.⁴² What the forensic science community and Hollywood refuse to inform their consumers and viewers is that while forensic science can effortlessly identify serial offenders it can just as easily inculcate a wholly innocent person. In short, all we typically see is the bright side of forensic science; rarely, if ever, are we made witness to its dark side. As of lately, this lesser known side of the

⁴⁰ John I. Thornton & Joseph L. Peterson, *The General Assumptions and Rationale of Forensic Identification*, in *SCIENCE IN THE LAW: FORENSIC SCIENCE ISSUES* 1, 20 (David L. Faigman et al. eds., 2d ed. 2002).

⁴¹ See Andrew Murr et al., *When Kids Go Missing*, *NEWSWEEK*, July 29, 2002, at 38 (discussing Samantha Runnion's kidnapping and murder).

⁴² This sentiment should not distort the fact that I enthusiastically believe that forensic science has the potential to answer the specialized questions that can bring justice to not only victims of violent crimes but also the wrongly convicted and accused. As the ensuing section explains, however, my conviction is premised on the fact that legitimately trained scientists are actually performing science.

forensic community has become increasingly darker. Because forensic science consumers are so rarely informed of these forensically caused injustices, I feel obligated to shed much needed light on these cases and this area of forensic science.

The forensic science community is in a unique situation. Yes, it is presumably experiencing its darkest hour given the undeniable correlation between dubious forensic science and wrongful convictions. On the other hand, though, these injustices afford the community an invaluable opportunity to learn from its mistakes. The knowledge produced from these injustices can generate many useful suggestions on how to improve forensic science services. Thus, while the forensic community may be encountering its bleakest hour, daylight is just around the corner if the appropriate directions are taken. In order to move in the right direction, we must first acknowledge that forensic science, like any other field of science, is not error free.

A. Death, Increased Reliability, and Science's Methodical Investigation: A Complimentary Fit . . . Theoretically Speaking

Because of that qualitative difference [with death], there is a corresponding difference in the need for reliability in the determination that death is the appropriate punishment in a specific case.⁴³

As the Supreme Court has repeatedly explained, “death is different.”⁴⁴ Consequently, the Court has continually held that the Fourteenth Amendment’s Due Process Clause requires a “greater degree of reliability when the death sentence is imposed.”⁴⁵ Likewise, the Court has persistently held that the “Eighth Amendment’s prohibition against cruel and unusual punishment gives rise to a special ‘need for reliability in the determination that death is the appropriate punishment’ in any capital case.”⁴⁶ Put simply, the Court demands a heightened degree of trustworthiness when the penal sanction is death.⁴⁷

⁴³ Woodson v. North Carolina, 428 U.S. 280, 305 (1976).

⁴⁴ See, e.g., Mills v. Maryland, 486 U.S. 367, 383 (1988); Strickland v. Washington, 466 U.S. 668, 704 (1984) (Brennan, J., concurring in part and dissenting in part); Lockett v. Ohio, 438 U.S. 586, 605 (1978); Gardner v. Florida, 430 U.S. 349, 357-58 (1977); Woodson v. North Carolina, 428 U.S. 280, 305 (1976); Furman v. Georgia, 408 U.S. 238, 306 (1972) (Stewart, J., concurring).

⁴⁵ Lockett, 438 U.S. at 604; see also Murray v. Giarratano, 492 U.S. 1, 8-9 (1989) (citing Lockett, 438 U.S. at 604); Ake v. Oklahoma, 470 U.S. 68, 87 (1985) (Burger, C.J., concurring) (“In capital cases the finality of the sentence imposed warrants protections that may or may not be required in other cases.”); Beck v. Alabama, 447 U.S. 625, 637-38 (1980) (noting that because death is different, the Supreme Court has “invalidated procedural rules that tended to diminish the reliability of the sentencing determination”).

⁴⁶ Johnson v. Mississippi, 486 U.S. 578, 584 (1988) (quoting Gardner v. Florida, 430 U.S. 349, 363-64 (1977)).

⁴⁷ See, e.g., Satterwhite v. Texas, 486 U.S. 249, 262-63 (1988) (Marshall, J., concurring); California v. Ramos, 463 U.S. 992, 998-99 (1983).

Science is premised on objectivity, methodology, and meticulousness. Considering these characteristics, one would assume that employing evidence derived from scientific investigations would enhance the fact-finding process in capital and noncapital cases.⁴⁸ Unfortunately, this assumption is not always true with respect to forensic evidence. Theoretically, the enhanced reliability hypothesis is entirely valid. Nonetheless, simply because a hypothesis is theoretically plausible or convincing does not necessarily mean its practical application will mirror its theoretically perceived legitimacy.⁴⁹ This is especially true when the practical application deviates significantly from its theoretical counterpart.⁵⁰

Three assumptions buttress the practical application argument: (1) forensic practitioners routinely perform not only methodical investigations but also (2) scientific investigations, and (3) those performing such investigations are meticulous scientists.⁵¹ Accordingly, if scientists are directing methodically driven, scientific investigations in the forensic science community, then the initial increased reliability hypothesis will most likely be accurate.⁵² However, if mere technicians, whose depth and breadth of scientific knowledge pales in comparison to traditional scientists, are performing haphazard, nonscientific and subjective investigations, then the increased reliability hypothesis will undoubtedly fail. Regrettably, the situation within the forensic science community resembles the latter rather than the former.

To begin with, considering the enormous caseloads of forensic practitioners, methodical investigations are the exception rather than the norm.⁵³ Second, very little science actually encompasses the forensic sciences

⁴⁸ As Professor Edward J. Imwinkelried asserts, “*If properly prepared and presented, scientific analysis can . . . increase the reliability of fact finding.*” EDWARD J. IMWINKELRIED, *THE METHODS OF ATTACKING SCIENTIFIC EVIDENCE* 418 (3d ed. 1997) (emphasis added).

⁴⁹ For instance, consider Dr. Cyril Wecht’s recent comment concerning the abysmal work being performed in many DNA crime laboratories:

It is assumed that [scientific] analyses will be performed expeditiously by experienced, competent specialists at top-level accredited forensic science laboratories. While this expectation is realistic in high-profile cases . . . the actual processing of DNA tests throughout the United States in routine cases is quite a different matter, and innocent lives hang in the balance. With few exceptions, crime labs are overwhelmingly backlogged . . . [and] [t]he deficiencies of personnel, space and equipment in forensic science labs often lead to shoddy practices and erroneous test results.

Cyril H. Wecht, *DNA Testing: Challenging the Gold Standard*, TALLAHASSEE DEMOCRAT, June 15, 2003, at 1.

⁵⁰ As Professor Imwinkelried notes, even though “[w]e have powerful new technologies such as DNA typing,” we must be continually cautious of such results given that, “at the laboratory benches we have human beings who are clay up to their eyebrows—and who modernly are often both undertrained and overworked.” Edward J. Imwinkelried, *Foreword*, 30 U.C. DAVIS L. REV. 941, 942-43 (1997).

⁵¹ A scientist is someone who possesses an academic and clinical understanding of the scientific method and the analytical dexterity to construct experiments that will generate the empirical reality that science mandates.

⁵² See Imwinkelried, *supra* note 50, at 943.

⁵³ See, e.g., Bob Doucette, *Court Upholds Death Penalty Denials*, DAILY OKLAHOMAN, Mar.

considering forensic identifications are not manifestations of science. Rather, they merely represent subjective determinations by law enforcement trained technicians. More importantly, individuality⁵⁴ is not a legitimate scientific expectation simply because it cannot be accomplished—even with probability theory.⁵⁵ Lastly, the forensic science community is top-heavy with well intentioned and facially objective technicians.⁵⁶ When all three factors intersect with one another, the forensic science and criminal justice systems have an extraordinary problem on their hands.

17, 2001 (noting how the heavy caseload at the Oklahoma State Bureau of Investigation crime lab negatively affected whether prosecutors could seek the death penalty against two defendants); Lewis Kamb, *Lack of DNA Database Hampers the Police*, SEATTLE POST-INTELLIGENCER, Feb. 27, 2003, at A8 (noting that the DNA caseloads at Washington state crime labs grow by 3000 to 5000 each month); Carol M. Ostrom, *Caseload, New Technology Pushed Crime Lab's Limits*, SEATTLE TIMES, Dec. 3, 2001, at A8 (noting how huge caseloads led to a large backlog of DNA cases); Diana Penner, *Crime Lab Backlog Angers Rape Victim*, INDIANAPOLIS STAR, Feb. 17, 2002 at 1A. (discussing how the “crushing” caseloads for DNA analysts have led to a backlog of 5,287 cases at Indiana State Police crime labs).

⁵⁴ Individuality is the theory that no two objects are identical. In the forensic science context individuality’s “fundamental goal is an inference of a singular common source.” KEITH INMAN & NORAH RUDIN, *PRINCIPLES AND PRACTICE OF CRIMINALISTICS: THE PROFESSION OF FORENSIC SCIENCE* 123 (2000). Accordingly, forensic individualization examiners are concerned with associating an item or a mark located at a crime scene to the one and only source of that item or mark to the elimination of all others in the world.

⁵⁵ See David A. Stoney, *What Made Us Ever Think We Could Individualize Using Statistics?*, 31 J. FORENSIC SCI. SOC’Y 197 (1991). More importantly, what are the sciences that support the forensic identification sciences of fingerprinting, bite mark identification, handwriting identification, and others? As Saks rightfully notes, “The forensic identification sciences have no basic science to undergird them.” Michael J. Saks, *Banishing Ipse Dixit: The Impact of Kumho Tire on Forensic Identification Science*, 57 WASH. & LEE L. REV. 879, 882 (2000). For more reasons why individuality is not a legitimate scientific expectation, see Erica Beecher-Monas, *The Heuristics of Intellectual Due Process: A Primer for Triers of Science*, 75 N.Y.U. L. REV. 1563, 1625-26 (2000); Michael J. Saks, *Merlin and Solomon: Lessons from the Law’s Formative Encounters with Forensic Identification Science*, 49 HASTINGS L.J. 1069, 1082-90 (1998).

⁵⁶ See Andrea A. Moenssens, *Novel Scientific Evidence in Criminal Cases: Some Words of Caution*, 84 J. CRIM. L. & CRIMINOLOGY 1, 5 (1993) (“Most of the witnesses who testify as experts for the prosecution are not truly scientists, but better fit the label of ‘technicians.’”). I emphasize “facially objective” to indicate that most biases that surface within the forensic context are subconscious. See Paul L. Kirk, *The Interrelationship of Law and Science*, 13 BUFF. L. REV. 393, 394 (1964) (“[T]echnician[s] merely follow[] prescribed routines, and [are] not expected to understand their underlying fundamentals. [The technician] knows how, but not why.”). As Professor Moenssens points out, “Nothing pejorative or negative is intended by the label ‘technician’ . . . technicians are perfectly competent to use techniques validated by others, and properly apply them to obtain perfectly reliable results.” Moenssens, *supra*, at 5 (emphasis added). The only problem with Professor Moenssens’ assertion is that most forensic identification techniques are *not* “validated by others” because they have no real use outside of the courtroom. Thus, the people who are allegedly validating these techniques are essentially the same non-science technicians who use them on a daily basis. See D. Michael Risinger et al., *The Daubert/Kumho Implications of Observer Effect in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CAL. L. REV. 1 (2002) (discussing how many forensic science procedures and practices increase the likelihood that subconscious biases will affect an examiner’s interpretation and ultimate conclusions).

B. The Infallibility of [Forensic] Science: An Illogical Perspective

In spite of being a firm advocate of forensic science, I must acknowledge that a disturbingly high percentage of laboratories are not performing routine tests competently, as shown by proficiency testing.⁵⁷

Science is premised on the scientific method.⁵⁸ Starting with a theory, scientists construct experiments in an attempt to disprove the theory. If scientists are unable to refute the theory, they must then formulate and construct an instrument or technique that will allow the theory to be practically applied in a particular environment (i.e., a forensic-type setting). Once and if this stage is reached, scientists must conduct further investigations to illustrate that a positive association exists between the results and the underlying theory. This practical research will also ascertain whether the observed results are truly the product of the new technique or whether they simply represent the byproduct of an unidentified factor or event.

More precisely, science thrives by detecting errors and shortcomings of asserted hypotheses. Once an error is detected, a theory is subsequently reformulated and put to the test once again. This cyclical nature of science, if taken to its extreme, will eventually, in some instances, lead to a new scientific law if a particular hypothesis or theory cannot be refuted. Besides new laws, innovative technology will also be spawned through this cyclical approach. While error detection is essential in refining laws and technology, it is also critical in determining whether the methods of observation and experimentation employed during scientific testing are legitimate means by which to draw objective inferences and conclusions. For the most part, the vast majority of scientific enterprises confront the error detection issue head on. They openly admit that such errors, especially those that occur during the observation and experimentation phase, are inevitable. In short, these scientific communities acknowledge that science is not being practiced if errors are not being detected.⁵⁹

Unlike most scientific communities, the forensic science community does not openly embrace the error detection topic. Rather, the community does one of two things when questioned about its alleged accuracy. It either buries its

⁵⁷ *Symposium on Science and the Rules of Legal Procedure*, 101 F.R.D. 599, 645 (1983) (quoting University of Illinois-Chicago forensic science professor, Joseph Peterson).

⁵⁸ The scientific method “is the persistent critique of arguments, in the light of tried canons for judging the reliability of the procedures by which evidential data are obtained, and for assessing the probative force of the evidence on which conclusions are based.” ERNEST NAGEL, *THE STRUCTURE OF SCIENCE: PROBLEMS IN THE LOGIC OF SCIENTIFIC EXPLANATION* 13 (1961).

⁵⁹ As the National Research Council (NRC) noted, “Even in the best of laboratories, . . . rates [of error] are not zero.” NATIONAL RESEARCH COUNCIL, *DNA TECHNOLOGY IN FORENSIC SCIENCE* 94 (1992). The NRC followed this report with another claiming that “the error rate can never be reduced to zero.” NATIONAL RESEARCH COUNCIL, *THE EVALUATION OF FORENSIC EVIDENCE*, at back cover (1996).

head in the sand or makes the infallibility claim. More often than not, the community claims that its respective techniques never generate any errors.⁶⁰ The infallibility notion is by no means novel.⁶¹ Remarkably, these repeated assertions of infallibility contradict numerous studies indicating that the error rate in the forensic sciences is far from zero.⁶²

Claims of infallibility can be attributed to two historical considerations. First, by claiming that forensic evidence was foolproof, the forensic science community supplied the courts with the kind of concrete, incontrovertible evidence that was expected from science.⁶³ This solid and indisputable

⁶⁰ See, e.g., *United States v. Havvard*, 260 F.3d 597, 599 (7th Cir. 2001) (“[FBI examiner] Meager also testified that the error rate for fingerprint comparison is essentially zero.”); *United States v. Sullivan*, 246 F. Supp. 2d 700, 703 (E.D. Ky. 2003) (noting that the FBI examiner “asserts that the rate of error for the ACE-V methodology is essentially zero”); *United States v. Ewell*, 252 F. Supp. 2d 104, 113 (D.N.J. 2003) (“[T]he [FBI] has demonstrated the scientific method [of DNA analysis] has a virtually zero rate of error.”); *United States v. Allen*, 207 F. Supp. 2d 856, 862 (N.D. Ind. 2002) (“[Examiner] Vanderkolk testified that the error rate of the [footprint identification] process . . . is zero.”); *State v. Johnson*, 905 P.2d 1002, 1012 (Ariz. Ct. App. 1995) (quoting an examiner’s testimony that his “laboratory had undergone several proficiency tests and that its laboratory error rate was currently zero”); *Ramirez v. State*, 810 So. 2d 836, 851 (Fla. 2001) (noting that the State’s toolmark expert in a death penalty case “testified that the method [of toolmark identification] is infallible, that it is impossible to make a false positive identification”); *Commonwealth v. Teixeira*, 662 N.E.2d 726, 728 (Mass. App. Ct. 1996) (noting that Agent Quill testified “that the error rate was reduced to zero by reason of his lab’s method of multiple-sample [DNA] analysis.”); *People v. Wesley*, 589 N.Y.S.2d 197, 200 (N.Y. App. Div. 1992) (“[I]t was unrefuted that it is *impossible* under the RFLP procedure to obtain a false positive result, i.e., to identify the wrong individual as the contributor of the DNA being tested.”); *People v. Huang*, 546 N.Y.S.2d 920, 921 (N.Y. Crim. Ct. 1989) (“Dr. Baird [the State’s DNA expert] testified that it is impossible to get a false positive reading. Environmental effects could at worst result in ‘no result,’ but never in a false positive reading.”); *State v. Payne*, No. 02AP-723, 2003 WL 22128810, at *13 (Ohio Ct. App. Sept. 16, 2003) (quoting a fingerprint examiner’s testimony that “the error rate [of fingerprinting] is essentially zero”); *Commonwealth v. Blasioli*, 685 A.2d 151, 165 n.29 (Pa. Super. Ct. 1996) (noting that crime lab director “testified that the Pennsylvania State Police lab had an error rate of zero: no errors had ever been detected”); *Hicks v. State*, 860 S.W.2d 419, 423 (Tex. Crim. App. 1993) (“Dr. Kevin McElfresh, Ph.D. . . . testified . . . that the [RFLP] procedures utilized had the ability to exclude suspects absolutely and that a false positive result was impossible.”); *State v. Jones*, 922 P.2d 806, 809 n.1 (Wash. 1996) (noting that a crime lab examiner “testified that the Washoe County laboratory is subject to external blind tests and proficiency testing and presently has a tested lab error rate of zero”).

⁶¹ See, e.g., *Moon v. State*, 198 P. 288, 290 (Ariz. 1921) (“It is claimed that by means of finger prints the . . . [London] police . . . during the 14 years from 1901 to 1914 have made over 103,000 identifications . . . without error.”); *People v. Jennings*, 96 N.E. 1077, 1081 (Ill. 1911) (noting “the great success of the [fingerprinting] system in England, where it has been used since 1891 in thousands of cases without error”).

⁶² See JOSEPH PETERSON ET AL., CRIME LABORATORY PROFICIENCY TESTING RESEARCH PROGRAM—FINAL REPORT (1978) (finding a high rate of error amongst crime labs); Joseph Peterson & Penelope N. Markham, *Crime Laboratory Proficiency Testing Results, 1978-1991, I: Identification and Classification of Physical Evidence*, 40 J. FORENSIC SCI. 994 (1995) (same).

⁶³ See Jennifer L. Mnookin, *Fingerprint Evidence in an Age of DNA Profiling*, 67 BROOKLYN

evidence differed substantially from turn-of-the-century expert scientific evidence.⁶⁴ Second, forensic science was nurtured and developed under the auspices of prosecutorial criminal law.⁶⁵ Consequently, considering the burden of proof placed upon prosecutors, acknowledging that errors are reasonable and unavoidable derivatives of science can spell disaster. This is especially true when the prosecution's case rests considerably on a forensic examiner's identification. If the forensic examiner were to testify that bite mark identifications have a "false positive" error rate of 63.5% and a "false negative" error rate of 22%, the examiner has established a fairly high degree of doubt.⁶⁶ However, if the forensic practitioner merely asserts that no error rate has been or can be identified, then the prosecution's burden of proving beyond a reasonable doubt the defendant's guilt is conveniently protected.⁶⁷

The entertainment media, as mentioned, has only perpetuated the misguided notion that forensic science is shielded from error.⁶⁸ According to Professor James E. Starrs, the mythical and fail-safe perception afforded to forensic science will eventually hinder the community's creditability, if it has not already. More importantly, it will invariably force forensic practitioners, in order to keep pace with the public's misperception of forensic science, to render opinions that go well beyond science and their area of expertise.⁶⁹ These speculative inferences will unquestionably generate more erroneous convictions because conjectures by forensic practitioners always seem to benefit the prosecution's case.⁷⁰

L. REV. 13, 38 (2001).

⁶⁴ As Professor Jennifer L. Mnookin explains, "Instead of shining the great light of science into the courtroom, expert evidence at the turn of the century was deemed, in practice, to be an embarrassing spectacle, reflecting badly on science and law alike." *Id.*

⁶⁵ See Saks, *supra* note 55, at 1091.

⁶⁶ The 63.5% and 22.0% figures actually represent the most recent findings of the American Board of Forensic Odontologists. See C. Michael Bowers, *The Scientific Status of Bitemark Comparisons*, in SCIENCE IN THE LAW: FORENSIC SCIENCE ISSUES 251-52 (David L. Faigman et al. eds., 2002).

⁶⁷ For instance, in *State v. Stevens*, former FBI profiler Greg McCrary claimed that because criminal profiling is "not a hard science where you can do controlled experiments," the FBI was never able to "come up with [error] ratios." No. M1999-02067-CCA-R3-DD, 2001 WL 579054, at *16 (Tenn. Crim. App. May 30, 2001).

⁶⁸ See Cyril H. Wecht, *Science Fiction; TV Programs Fail to Show Busy, Overworked Forensic Labs*, PATRIOT-NEWS (Harrisburg, Pa.), May 4, 2003, at D03 ("These shows tend to embellish and exaggerate the science, ignore actual time lines for testing and raise expectations of the general public, law enforcement and judicial system to an extremely absurd and totally unrealistic level.").

⁶⁹ See James E. Starrs, *Foreword*, in FORENSIC SCIENCE: AN INTRODUCTION TO SCIENTIFIC AND INVESTIGATIVE TECHNIQUES i, x (Stuart H. James & Jon J. Nordby eds., 2002).

⁷⁰ For instance, in the Houston crime lab debacle, independent expert Dr. Elizabeth Johnson commented that the Houston Police Department crime lab personnel "intentionally mislead . . . And in all the cases . . . they always mislead in favor of a conviction." Steve McVicker, *Lab Chief's Testimony in 3 Cases Questioned; Court Transcripts Show HPD Work Was Wrong*, HOUS. CHRON., Mar. 29, 2003, at A37.

The belief that forensic science is somehow safeguarded against error is foolish and not an accurate picture of a community that continually asserts it is practicing science. As Professor Max Hirschberg noted some sixty years ago, “A real student of science is too well aware of the fallibility of scientific knowledge to presume infallibility, while a charlatan tries to force his infallibility on his public.”⁷¹ As the ensuing Parts will continually reveal, while “[f]orensic experts often present their findings with great confidence . . . infallibility is unfortunately not a characteristic of forensic [practitioners or] laboratories.”⁷²

C. *Wrongful Convictions and Erroneous Forensic Science: The Myth of Infallibility*

Physical evidence cannot be wrong; it cannot be perjured; it cannot be wholly absent. Only in its interpretation can there be error. Only human failure to find, study, and understand it can diminish its value.⁷³

According to forensic scientist and historian Joseph L. Peterson, “One of the cornerstones of forensic science is the presumed validity and reliability of scientific test results and interpretations.”⁷⁴ Professor Peterson’s presumption, however, must now be viewed through a more cautious lens because flawed “forensic science [i.e., honest errors] has played a large part in . . . erroneous convictions.”⁷⁵ In many of these cases, forensic [individualization] examiners, especially hair examiners,⁷⁶ offered opinions that were later proven to be inaccurate or completely false. In twenty-one of the more recent exonerations—Stephan Cowans,⁷⁷ Mark Dallagher,⁷⁸ Angela Cannings,⁷⁹ Ray

⁷¹ Hirschberg, *supra* note 1, at 34.

⁷² Richard Lempert, *Some Caveats Concerning DNA as Criminal Identification Evidence: With Thanks to the Reverend Bayes*, 13 CARDOZO L. REV. 303, 324 (1991).

⁷³ PAUL L. KIRK, *CRIME INVESTIGATION 2* (2d John I. Thornton ed., 1974).

⁷⁴ Peterson & Markham, *supra* note 62, at 994.

⁷⁵ Michael J. Saks, *Scientific Evidence and the Ethical Obligation of Attorneys*, 49 CLEV. ST. L. REV. 421, 423 (2001); *see also* Craig M. Cooley, *Forensic Science and the Death Penalty* (2002) (unpublished manuscript, available at http://www.law-forensic.com/fs_and_dp.htm) (citing numerous instances where erroneous forensic science led to wrongful convictions). It should be stressed that “played a large part” by no means equates to “absolutely caused.”

⁷⁶ *See, e.g.*, EDWARD CONNORS ET AL., NATIONAL INSTITUTE OF JUSTICE, CONVICTED BY JURIES, EXONERATED BY SCIENCE: CASE STUDIES IN THE USE OF DNA EVIDENCE TO ESTABLISH INNOCENCE AFTER TRIAL (1996) [hereinafter NIJ REPORT] (finding that, out of twenty-eight erroneous convictions, six had hair comparison testimony supporting the original conviction); Clive A. Smith & Patrick D. Goodman, *Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil*, 27 COLUM. HUM. RTS. L. REV. 227 (1996) (discussing hair identification’s questionable scientific foundation).

⁷⁷ *See* David Weber & Kevin Rothstein, *Man Freed After 6 Years; Evidence Was Flawed*, BOSTON HERALD, Jan. 24, 2004, at 4 (explaining how a misidentified fingerprint may have led to Cowans’ erroneous conviction).

⁷⁸ *See* Roger Ede, *Wrongful Convictions Put Forensic Science in the Dock*, THE TIMES (London), Feb. 3, 2004, at 3 (discussing how a misidentified ear print may have led to

Krone, Charles Fain, Rudolph Holton, Madison Hobley,⁸⁰ Jeffery Todd Pierce,⁸¹ Joshua Sutton,⁸² Sally Clark,⁸³ Clayton Johnson,⁸⁴ Ronald Dolton,⁸⁵ Jimmy Ray Bromgard,⁸⁶ Paul Kordonowy,⁸⁷ Christopher Conover,⁸⁸ John Peel,⁸⁹ and the Central Park Jogger exonerees⁹⁰—the exonerated's initial trial included testimony from a forensic examiner that was later established to be imprecise or clearly mistaken. One case actually involved miscalculated statistics with respect to DNA evidence, while another case involved a misidentified fingerprint. Most significantly, Krone, Fain, Holton, and Hobley were all sentenced to death.

By no means are these cases the only ones where forensic evidence was originally offered during a capital trial to prove the defendant's guilt, but was later discovered to be inaccurate or entirely erroneous. Exonerated capital defendants have endured such erroneous forms of forensic evidence as misidentified bite marks, misinterpreted burn patterns, mistaken hair

Dallagher's wrongful conviction).

⁷⁹ *No Defense; Justice Demands the Highest Standards from Forensic Science*, NEW SCIENTIST, Jan. 31, 2004, at 3 (discussing how Cannings's wrongful conviction may have resulted from erroneous statistics with respect to infant deaths).

⁸⁰ The cases of Krone, Fain, Holton, and Hobley are discussed *infra* app. A.

⁸¹ See Diana Baldwin, *Freed Man Sues Ex-DA, Chemist for Conviction*, DAILY OKLAHOMAN, Jan. 16, 2003, at 1 (discussing how erroneous hair testimony may have led to Pierce's wrongful conviction).

⁸² See Liptak, *supra* note 5 (noting that a DNA statistical miscalculation most likely resulted in Sutton's erroneous conviction).

⁸³ See Geoffrey Wansell, *Why These Cot Death Witch-Hunts Must Stop*, DAILY MAIL (London), June 13, 2003, at 29 (noting that a statistical miscalculation regarding infant deaths may have led to Clark's wrongful conviction).

⁸⁴ See Kirk Makin, *A Wrongful Conviction: Forensic Science Backs Freak-Fall Theory*, GLOBE & MAIL (Toronto), Feb. 19, 2002, at A6 (discussing how an erroneous cause of death determination did in fact cause Johnson's wrongful conviction).

⁸⁵ See Richard Foot, *Pathologist Sued Over Wrongful Conviction*, NAT'L POST, Mar. 9, 2002, at A06 (discussing how an erroneous cause of death determination led to Dolton's wrongful conviction).

⁸⁶ See Adam Liptak, *2 States to Review Lab Work of Expert Who Erred on ID*, N.Y. TIMES, Dec. 19, 2002, at A24 (suggesting that faulty hair identification testimony presumably led to Bromgard's erroneous conviction).

⁸⁷ See Becky Bohrer, *More Cases Questioned in Crime Lab Case*, AP ONLINE, May 29, 2003, available at 2003 WL 56084143 (noting that flawed hair identification testimony may have resulted in Kordonowy's erroneous conviction).

⁸⁸ See Sarah Brumfield, *DNA Clears Md. Man of 1985 Killings*, AP ONLINE, June 19, 2003, available at 2003 WL 57822617 (noting that faulty hair testimony may have led to Conover's erroneous conviction).

⁸⁹ ABC Action News Report, *Medical Examiner's Apparent Mistakes Put Man in Jail* (2002), at http://www.law-forensic.com/cfr_wood_1.htm (noting that an erroneous cause of death determination did in fact lead to Peel's wrongful conviction).

⁹⁰ See Jim Dwyer & Susan Saulny, *Hair Evidence in Jogger Case Is Discredited*, N.Y. TIMES, Oct. 25, 2002, at B1 ("Contrary to arguments made by a prosecutor at two trials in 1990, four strands of hair were never 'matched' to any of the Harlem teenagers accused of beating and raping a jogger in Central Park.").

identifications, incorrect bullet identifications, and forensic fraud.⁹¹ Moreover, various capital cases are currently pending on appeal or habeas where serious questions have been directed not only at the defendant's guilt and death sentence but also at the forensic evidence employed to establish the defendant's guilt and death-worthiness.⁹² Again, these cases simply represent capital wrongful convictions. Noncapital wrongful convictions and accusations have also increased, especially since the advent of DNA testing.⁹³

The fact that errors surface within the forensic community is not what frustrates the defense bar, forensic watchdogs, or even prosecutors. Errors are inevitable in any scientific enterprise. Nevertheless, when scientists identify shortcomings concerning a particular hypothesis or method of observation, they take it upon themselves to rectify the identified inadequacies. This is typically accomplished by either reconfiguring the hypothesis or by making the necessary adjustments to the manner of observation. As forensic scientists Norah Rudin and Keith Inman explain, "Analysts are human beings; the question is not 'will an error occur?' but 'when an error occurs, how can it be detected and corrected?'"⁹⁴

The forensic community, as mentioned, does neither. It rarely, if ever, engages in error detection. Consequently, error rates for many forensic techniques are not known.⁹⁵ Moreover, if errors are detected, the community simply blames the errors on the individual examiner and not the methodology.⁹⁶

⁹¹ See *infra* app. A.

⁹² See *infra* app. B.

⁹³ See Craig M. Cooley, *For-gettable Science or For-ensic Science: Wrongful Convictions and Accusations Attributable to Forensic Science*, at http://www.law-forensic.com/cfr_science_myth.htm (last visited Mar. 15, 2004) (listing many cases).

⁹⁴ Norah Rudin & Keith Inman, *Exonerated by Science*, 37 JURIMETRICS J. 319, 321 (1997).

⁹⁵ See Randolph N. Jonakait, *The Meaning of Daubert and What That Means for Forensic Science*, 15 CARDOZO L. REV. 2103, 2117 (1994).

⁹⁶ See SIMON A. COLE, SUSPECT IDENTITIES: A HISTORY OF FINGERPRINTING AND CRIMINAL IDENTIFICATION 264-65, 282-83 (2001) (discussing how the fingerprint community employs this rationale). For instance, consider the following example with respect to PCR/STR testing:

As the government points out in its reply, its experts did not deny the potential for measurement errors. However, the FBI has determined an acceptable range of measurement error for its PCR/STR typing methodology. Thus, if the methodology is followed and properly calibrated instruments are used, the error rate for the methodology is zero. Error is understood in this context as an incorrect result. This does not mean that errors do not occur, but rather that the FBI has conducted studies and has attempted to control for typical errors.

United States v. Trala, 162 F. Supp. 2d 336, 350 (D. Del. 2001); see also United States v. Ewell, 252 F. Supp. 2d 104, 109 (D.N.J. 2003) ("The testimony indicates that if a[] [DNA] analyst follows the FBI protocol and uses properly calibrated instruments, there is essentially zero rate of error, i.e., obtaining a wrong result, within established measurement conditions. The Government concedes, however, that this result is subject to human error."); United States v. Sullivan, 246 F. Supp. 2d 700, 703 (E.D. Ky. 2003) ("Any errors in the fingerprint evaluation process, the [FBI] contends, are due to practitioner error, not any fault with the ACE-V methodology itself. Practitioner error, the [FBI] argues, can be effectively controlled by ensuring that the examiner performing the analysis is qualified."). As Professor Mnookin

Thus, little is ever rectified even if errors continually surface. The apathy directed toward proactive refinement is what vexes the defense bar and forensic skeptics. Many injustices, particularly in the hair identification cases, could have been avoided if such an approach was advocated and pursued.

The forensic science community's incestuous affiliation with law enforcement is partially responsible for its lack of proactive fine-tuning. Forensic practitioners, like their academic counterparts, employ scientific techniques in order to find truth in particular contexts. However, their societal role differs considerably from academic scientists because their primary function is to afford a service to a consumer by answering specific inquiries about evidence.⁹⁷ In essence, forensic practitioners are service providers whose services are usually offered to law enforcement or prosecutorial agencies. The role of "service provider" has significant repercussions, especially concerning error rate detection. As Professor William C. Thompson explains, playing such a role has forced the forensic science community to develop a guild-like mentality.⁹⁸ Forensic scientists frequently avoid answering questions regarding a technique's accuracy while also refraining from publicly criticizing a fellow colleague's questionable work. In short, a communal attitude has developed where practitioners are frowned upon by their fellow peers when their publications reflect negatively on the forensic community's work product.⁹⁹ Quelling any criticism achieves the community's ultimate goal of "promot[ing] the impression that their techniques are accurate and reliable and that their conclusions are trustworthy."¹⁰⁰ These credibility-enhancing labors, however, are antithetical to science's self-centered scrutiny. More importantly, they severely inhibit forensic practitioners from identifying and rectifying problems associated not only with certain forensic methodologies but also with particular theories (e.g., the theory of individuality).¹⁰¹ Consequently, the forensic science community's infrastructure must be reconfigured so error detection will not be viewed as an obstacle to obtaining a conviction but rather as a legitimate and essential aspect of science and scientific investigations.

correctly points out, this reasoning "borders on the tautological (if the method is perfectly done, it will operate correctly)." D.H. Kaye et al., *Expert Testimony on Fingerprints: An Internet Exchange*, 43 JURIMETRICS J. 91, 95 (2002).

⁹⁷ See William C. Thompson, *A Sociological Perspective on the Science of Forensic DNA Testing*, 30 U.C. DAVIS L. REV. 1113, 1114 (1997).

⁹⁸ See *id.*

⁹⁹ See *id.*

¹⁰⁰ *Id.*

¹⁰¹ See *id.* at 1114-15.

D. *Wrongful Convictions and Forensic Fraud: What CSI and Crossing Jordan Choose Not to Discuss*

A large enough volume of incompetence adds up to corruption¹⁰²

Some world-class fabricators have surfaced [within the science forensic community].¹⁰³

Science's symbiotic relationship with honest human error is justifiable and necessary. The same cannot be said regarding science's reaction and affiliation with purposeful blunders, fraud, and misconduct. Scientific misconduct of any kind, regardless of its depth or breadth, is not tolerated at any time in a community that is premised entirely on honesty and objectivity. Analytically agile scientists can modify hypotheses and reconfigure procedures to decrease benevolently produced errors. They cannot, however, defend themselves, the scientific community, or society in general, from fraudulent scientists. Such scientists, if not stopped, wreak havoc on the scientific community and, even worse, can inflict irreparable harm on medical patients, victims of crime, and criminal defendants.¹⁰⁴

Scientific fraud and misconduct have become an ever-increasing problem nationally and internationally.¹⁰⁵ However, awareness and reforms have predominantly been directed at nonforensic science related occurrences.¹⁰⁶ This skewed reporting has created the perception that scientific fraud or misconduct is alien from the forensic science community. Nothing could be further from the truth. Over the past decade, numerous instances of fraud "have come to light involving forensic scientists who were either astonishingly inept or downright corrupt, and who faked and massaged results for years without detection."¹⁰⁷

¹⁰² Thomas Marshall, *Quick Job Needed to Free Innocent*, HOUS. CHRON., Apr. 5, 2003, at 31 (quoting Houston Law School Professor David Dow).

¹⁰³ Paul C. Giannelli, *Fabricated Reports*, 16 CRIM. JUST. 49, 49 (2002).

¹⁰⁴ See C. Beth Sise, *Scientific Misconduct in Academia: A Survey and Analysis of Applicable Law*, 28 SAN DIEGO L. REV. 401, 402 (1991).

¹⁰⁵ See Joe A. Flores, *International Scientific Misconduct and the Legal System*, INT'L TRADE L. J. 60, 60 (2000) (discussing various instances of fraud and misconduct).

¹⁰⁶ Most of the law review articles concerning this issue fail to discuss any instances of forensic fraud or misconduct. See *supra* notes 104, 105; see also Jesse A. Goldner, *The Unending Saga of Legal Controls Over Scientific Misconduct: A Clash of Cultures Needing Resolution*, 24 AM. J.L. & MED. 293 (1998); Barbara A. Lee, *Scientific Misconduct: Institutional Procedures and Due Process Considerations*, 11 J.C. & U.L. 51 (1984). I am aware of only one law review article and two books that discuss the problems of fraud and misconduct in the forensic science context. See MALCOLM BROWN & PAUL WILSON, *JUSTICE & NIGHTMARES: SUCCESSES AND FAILURES OF FORENSIC SCIENCE* (1992) (discussing the forensic mishaps in Australia and New Zealand); JOHN F. KELLY & PHILLIP K. WEARNE, *TAINTING EVIDENCE: INSIDE THE SCANDALS AT THE FBI LABORATORY* (1998) (describing the problems within the FBI's crime lab); Paul C. Giannelli, *The Abuse of Scientific Evidence in Criminal Cases: The Need for Independent Crime Laboratories*, 4 VA. J. SOC. POL'Y & L. 439 (1997).

¹⁰⁷ Jennifer L. Mnookin, *Scripting Expertise: The History of Handwriting Identification*

Misconduct and fraud in any scientific context, particularly the forensic context, is difficult to discuss and identify.¹⁰⁸ For instance, one scientist's error or oversight is another's intentional falsification. Likewise, two scientists may simply disagree about the interpretation of data and evidence. Differences of interpretation, especially those concerning individuality, are a frequent occurrence in the forensic science community. Diversity of opinion is expected because the community has very few, if any, standards that clearly articulate the appropriate criteria for individualizing physical evidence.¹⁰⁹

The forensic science community, unlike the academic community, must also contend with the various legal rules of discovery.¹¹⁰ Likewise, they must cope with the testimonial responsibilities of their position.¹¹¹ The rules of discovery make the determination of misconduct even more convoluted because what might be material or exculpatory evidence to one forensic practitioner or prosecutor might appear to be irrelevant to others.¹¹² Testifying

Evidence and the Judicial Construction of Reliability, 87 VA. L. REV. 1723, 1725 (2001); see also REPORT OF THE GOVERNOR'S COMMISSION ON CAPITAL PUNISHMENT, *supra* note 33, at 52 (acknowledging the forensic fraud problem); Beth Teitell, *Evidence Can Be True Lies; Experts Faked Forensics 'Surprisingly Widespread'*, BOSTON HERALD, July 31, 1994, at 18 ("[T]he problem of fabricated or faked evidence is . . . 'widespread.'").

¹⁰⁸ See Sise, *supra* note 104, at 404.

¹⁰⁹ See Henry Lee, *Forensic Science and the Law*, 25 CONN. L. REV. 1117, 1124 (1993) ("Perhaps the most important issue in forensic science is the establishment of professional standards. An assessment is needed of standards of practice in the collection, examination, and analysis of physical evidence."). For instance, there have been various cases where forensic dentists have been at odds with one another concerning whether a particular mark on a victim was, in fact, a bite mark or not. See *Davis v. State*, 611 So. 2d 906 (Miss. 1992) (noting disagreement between state and defense experts about whether mark was human bite mark); *People v. Smith*, 63 N.E.2d 879 (N.Y. 1984) (same); *State v. Kendrick*, 736 P.2d 1079 (Wash. Ct. App. 1987) (same). There have also been cases where forensic dentists have disagreed about whether a particular individual was the source of a bite mark. See *Milone v. Camp*, 22 F.3d 693 (7th Cir. 1994); *Banks v. State*, 725 So. 2d 711 (Miss. 1997); *Brown v. State*, 690 So. 2d 276 (Miss. 1996); *Spence v. State*, 795 S.W.2d 743 (Tex. Crim. App. 1990). Likewise, firearms examiners have disagreed with one another's identifications. See *In re Kirschke*, 125 Cal. Rptr. 680, 684 (Cal. Ct. App. 1975) (noting that one firearms identification expert made a conclusive identification, whereas other experts "were not able to make a positive identification"); *State v. Nemeth*, 438 A.2d 120, 123 (Conn. 1980) (one expert testified "that he was unable to determine whether the bullets had been fired from the same gun," whereas another "testified that both bullets had been fired from the same gun"); *Commonwealth v. Ellis*, 364 N.E.2d 808, 812 (Md. 1977) ("The Commonwealth's two [firearms identification] experts did not fully agree.").

¹¹⁰ The seminal Supreme Court case dealing with disclosure of exculpatory and material evidence is *Brady v. Maryland*, 373 U.S. 83 (1963). See also *Kyles v. Whitley*, 514 U.S. 419 (1995); *United States v. Bagley*, 473 U.S. 667 (1985); *United States v. Agurs*, 427 U.S. 97 (1976).

¹¹¹ The "single feature that distinguishes forensic scientists from any other scientist is the expectation that they will appear in court and testify to their findings and offer an opinion as to the significance of their findings." Thornton & Peterson, *supra* note 40, at 4.

¹¹² The *Brady* Court held, "[T]he suppression by the prosecution of evidence favorable to an accused upon request violates due process where the evidence is *material* either to guilt or to punishment, irrespective of the good faith or bad faith of the prosecution." *Brady*, 373 U.S.

also creates a whole assortment of problems with respect to identifying fraud. For example, if courts permit forensic practitioners to base their opinions or conclusions on their collective experience rather than verifiable empirical evidence derived from reliable and valid methodologies, do forensic practitioners behave unscientifically or fraudulently if they choose to take advantage of such a rule?

It is certainly justifiable to differ about the proper definition of misconduct. Nevertheless, the reported instances of wrongdoing in the forensic science community are so inexcusable that no one would consider it intellectual nickel-and-diming to refuse to write off such conduct as mere difference of judgment or honest error. Moreover, when misconduct is done on a larger scale, it can only be defended as innocent by assuming incompetence and carelessness of the most shocking sort.¹¹³

Forensic science misconduct and fraud can be categorized into two groups. The first group consists of those instances that would be deemed misconduct in any scientific context, such as reporting results for experiments that were never performed, fabricating evidence, and failing to follow proper scientific procedures. The second group consists of misconduct in the legal sense. Examples include failing to disclose evidence that is unmistakably exculpatory, knowingly giving false testimony, testifying outside one's expertise, utilizing one's experience to substantiate a scientific conclusion, or testifying to scientific theories that have yet to be validated.

The most obvious example of forensic fraud is the reporting of results for tests that were never performed. Ralph Erdmann, a forensic pathologist from Texas who was convicted of faking autopsies, has the distinction of being one of the foremost forensic fabricators.¹¹⁴ At least twenty death penalty convictions were obtained with the aid of his testimony.¹¹⁵ Erdmann is not the only practitioner to engage in such charlatanry.¹¹⁶ The forensic science

at 87 (emphasis added). Evidence is "material" if there is a reasonable likelihood that the evidence would have brought about a different result with respect to the issue of guilt or punishment. See *Kyles*, 514 U.S. at 434; see also PETER D. BARNETT, *ETHICS IN FORENSIC SCIENCE: PROFESSIONAL STANDARDS FOR THE PRACTICE OF CRIMINALISTICS* 54-55 (2001) ("Discovery is a recurring theme, present in many of the critical dilemmas faced by criminalists.").

¹¹³ The Houston crime laboratory fiasco, discussed *infra* notes 148-55, is a perfect example of this form of widespread incompetence.

¹¹⁴ See Geoffrey A. Campbell, *Erdmann Faces New Legal Woes: Pathologist Indicted for Perjury in Texas Murder Trial*, A.B.A. J., Nov. 1993, at 32; Richard L. Fricker, *Grave Mistakes*, A.B.A. J., Dec. 1993, at 46 (quoting a law enforcement official as stating that Erdman treated autopsies as if they were "kindergarten classes or show and tell").

¹¹⁵ See Roberto Suro, *Ripples of a Pathologist's Misconduct in Graves and Courts of West Texas*, N.Y. TIMES, Nov. 22, 1992, at 22.

¹¹⁶ See, e.g., Timothy W. Maier, *Federal Judge Slams Fingerprint 'Science'*, INSIGHT ON THE NEWS, Mar. 18, 2002, at 20 (discussing how a former Wisconsin State Police fingerprint analyst skipped tests and then claimed in his reports that he had conducted the tests); Jonathan Osborne, *Perry to Decide if DPS Lab Must Face Legislative Inquiry*, AUSTIN

community has also had its share of fingerprint fabricators.¹¹⁷ David Harding and his New York State Police colleagues take home the award for the most proficient fingerprint fabricators.¹¹⁸ Fingerprint fabrications have led to various wrongful convictions.¹¹⁹ With respect to purposely creating illegible lab reports, some contend that the FBI deliberately structures their reports to confuse other scientists or defense attorneys, making replication of their questionable results nearly impossible.¹²⁰

In regards to the second category, Pamela Fish's egregious conduct is the best illustration of where a forensic practitioner knowingly chose not to disclose scientific evidence that was unmistakably exculpatory. In two cases, Fish's lab reports and testimony indicated that ABO blood typing tests either inculpated the defendants or that the results were inconclusive. However, in both instances, once the defendants' post-conviction attorneys received Fish's handwritten lab notes, it was obvious that the ABO testing did in fact exclude the defendants.¹²¹ So far, seven convictions have been overturned in which Fish provided misleading testimony.¹²² Once again, these are not the only instances where a forensic practitioner's lab notes significantly deviated from their trial

AMERICAN-STATESMAN, Jan. 4, 2001, at B7 (discussing how a former Texas Department of Public Safety analyst falsified fingerprint reports); Kelly Thornton, *Police Lab Accused of Sloppy Work, False Data*, SAN DIEGO UNION-TRIB., May 24, 1997, at A-1 (discussing how a San Diego Police crime lab DNA analyst falsified reports).

¹¹⁷ Fingerprint examiner Pat Wertheim "believes these cases number in the hundreds or even thousands." Pat A. Wertheim, *Detection of Forged and Fabricated Latent Prints: Historical Review and Ethical Implications of the Falsification of Latent Fingerprint Evidence*, 44 J. FORENSIC IDENTIFICATION 652, 653 (1994); see also Boris Geller et al., *A Chronological Review of Fingerprint Forgery*, 44 J. FORENSIC SCI. 963 (1999).

¹¹⁸ According to New York prosecutors, they faked fingerprints in more than forty cases. See NELSON E. ROTH, *THE NEW YORK STATE POLICE EVIDENCE TAMPERING INVESTIGATION: REPORT TO THE HONORABLE GEORGE PATAKI, GOVERNOR OF THE STATE OF NEW YORK* (1997).

¹¹⁹ See Bob Baker & Paul Lieberman, *Faulty Ballistics in Deputy's Arrest: Eagerness to 'Make' Gun Cited in LAPD Lab Error*, L.A. TIMES, May 22, 1989, at 1, (discussing William DePalma's wrongful conviction); Victoria Laurie, *The Bloodhound's Tale*, AUST. MAG., Oct. 12, 2002, at 28 (discussing Ray, Peter, and Brian Mickelberg's wrongful convictions); *Police Faking Fingerprints to Solve Cases*, ABC WORLD NEWS TONIGHT, Feb. 15, 1994 (discussing Shirley Kinge's wrongful arson and burglary conviction).

¹²⁰ See KELLY & WEARNE, *supra* note 106, at 21.

¹²¹ See Steve Mills, *4 Cleared in Roscetti Case File Suit*, CHI. TRIB., Jan. 19, 2002, at 1 (suggesting that Fish's misleading testimony presumably resulted in four wrongful conviction). Fish is not the only Chicago Police crime laboratory analyst to purposely withhold exculpatory evidence. See, e.g., *Jones v. City of Chicago*, 856 F.2d 985, 991-93 (7th Cir. 1988).

¹²² See, e.g., Robert C. Herguth, *Report Slams 80s Police Lab*, CHI. SUN-TIMES, Jan. 14, 2001, at 5 ("Fish . . . provide[d] false or incomplete testimony in nine cases, including one involving Billy Wardell and Donald Reynolds, who were wrongly convicted of the 1986 rape of two University of Chicago students. They were exonerated through DNA testing."); Maurice Possley, *Ex-Inmate Exonerated of Rapes Tries To Get His Life In Order*, CHI. TRIB., June 29, 2000, at 4 (suggesting that Fish's misleading testimony presumably resulted in John Willis' wrongful conviction).

testimony.¹²³ With respect to providing knowingly false testimony that is not unmistakably exculpatory, FBI examiner Kathleen Lundy recently admitted to intentionally providing false testimony about the FBI's comparative bullet lead analysis technique in a Kentucky murder trial.¹²⁴

Forensic practitioners' testimony must remain within the boundaries of their asserted expertise.¹²⁵ While such advice is clearly warranted, "Expert witnesses [still] notoriously stray outside the fields of their expertise."¹²⁶ Besides venturing beyond their expertise, forensic practitioners have repeatedly buttressed their alleged scientific conclusions not on science but rather on their collective experience.¹²⁷ Though permitted by the courts, experience-based testimony dissociates the witness from science and the scientific method. Accordingly, once science has been divorced from the forensic scientist, then he or she has no justifiable function in the courtroom. Simply put, "If there is no science, there can be no forensic science."¹²⁸ Joyce Gilchrist, the former Oklahoma City crime lab analyst, is perhaps best known for invoking the

¹²³ See *infra* notes 247-52 and accompanying text (discussing Janice Roadcap's conduct).

¹²⁴ See John Solomon, *Scandal over Shoddy Tests, Lying Puts FBI Crime Lab Under Cloud*, TORONTO STAR, Apr. 17, 2003, at A25. Lundy's knowingly false testimony may have mistakenly sent Shane Ragland to prison for Trent DiGiuro's murder. See Wolfson Andrew, *Convicted Killer Ragland Seeks Pardon*, COURIER-JOURNAL (Louisville, Ky.), Nov. 22, 2003, at 1B (discussing how Ragland's supporters have asked the Kentucky Governor for a pardon). Lundy ultimately pled guilty for falsely testifying and received a ninety-day suspended sentence and a \$250 fine. See Mark Pitsch, *Ex-FBI Scientist Pleads Guilty*, COURIER-JOURNAL (Louisville, KY), June 18, 2003, at 1B. The FBI's comparative bullet lead analysis will be discussed *infra* notes 298-306 and accompanying text.

¹²⁵ See James E. Starrs, *In the Land of Agog: An Allegory for the Expert Witness*, 30 J. FORENSIC SCI. 289, 293 (1985).

¹²⁶ Moenssens, *supra* note 56, at 7; see, e.g., *Fisher v. State*, 361 So. 2d 203, 204 (Fla. Dist. Ct. App. 1978) (quoting state medical examiner's testimony that stab wounds were "more characteristic of those made by a woman"); *Jones v. State*, 660 P.2d 634, 641 (Okla. Crim. App. 1983) (noting that the state's medical examiner "testified that in his opinion some of the marks in the mud around the body could have been made by a person with an artificial limb"); *Commonwealth v. Henry*, 569 A.2d 929, 934 (Pa. 1990) (noting that the prosecution's forensic dentist testified that bite mark was sadistically inflicted); *Commonwealth v. Graves*, 456 A.2d 561, 565 (Pa. Super. Ct. 1983) (noting that the prosecution's forensic dentists testified that they were able to connect scratches on victim's back to defendant's fingernails); *State v. Steward*, 660 P.2d 278, 279-80 (Wash. Ct. App. 1982) (recounting that the state's pathologist testified that wounds inflicted on children of single mother were "most likely" caused by a live-in or babysitting boyfriend).

¹²⁷ As Professors John I. Thornton and Joseph L. Peterson explain,

[E]xperts exploit situations where intuition or mere suspicion can be voiced under the guise of experience. When an expert testifies to an opinion, and bases that opinion on "years of experience," the practical result is that the witness is immunized against effective cross-examination. When the witness testifies that "I have never seen another similar instance in my 26 years of experience," no real scrutiny of the opinion is possible. No practical means exists for the questioner to delve into the extent and quality of that experience. Many witnesses have learned to invoke experience as a means of circumventing the responsibility of supporting an opinion with hard facts.

Thornton & Peterson, *supra* note 40, at 16-17.

¹²⁸ *Id.* at 17.

experience “shield.”¹²⁹ Twenty-three capital cases have been identified in which Gilchrist provided testimony. Of those, eleven convicted murderers have already been put to death, while twelve are currently awaiting execution.¹³⁰ Again, Gilchrist is not the sole forensic examiner to employ the “experience” shield.¹³¹

There are certain “self-validating expert[s], who use scientific terminology to present unsubstantiated personal beliefs.”¹³² Drs. Michael West and Louise Robbins best personify such individuals. Dr. West, a forensic dentist from the South, is well known for his dubious use of a special blue light to evaluate bite marks and other wounds. With yellow-lensed goggles and a long-wave ultraviolet light, West has repeatedly professed that he can see things that are otherwise imperceptible to the naked eye.¹³³ West’s “blue-light” theory, however, has never been substantiated by another forensic dentist or scientist. This has yet to stop West, as he has testified in nearly twenty death penalty cases.¹³⁴ Forensic anthropologist Louise Robbins’ claim to fame was her ability to individualize footprints where it seemed no one else could do so.¹³⁵

¹²⁹ See James E. Starrs, *The Forensic Scientist and the Open Mind*, 31 J. FORENSIC SCI. SOC’Y 111, 130 (1991) (discussing Gilchrist’s tendency to employ the “experience” rationale).

¹³⁰ See Jim Yardley, *Oklahoma Retraces Big Step in Capital Case*, N.Y. TIMES, Sept. 2, 2001, at 12; see also *LaFevers v. Gibson*, 238 F.3d 1263, 1266 (10th Cir. 2001); *Mitchell v. Gibson*, 262 F.3d 1036, 1044 (10th Cir. 2001).

¹³¹ In *State v. Fortin*, a death penalty case, retired FBI profiler Roy Hazelwood based his opinion that two different crimes, a murder and an attempted murder, were committed by the same offender by claiming, “In my 35 years of experience . . . I have never observed this combination of behaviors in a single crime of violence . . . [Consequently], it is my opinion that the same person was responsible for the murder of Ms. Melissa Padilla and the subsequent attempted murder of Ms. Vicki Gardner.” 724 A.2d 818, 826 (N.J. Super. Ct. App. Div. 1999). The New Jersey Supreme Court recently overturned Fortin’s death sentence and conviction because Mr. Hazelwood should not have been permitted to testify on violent sexual crimes without producing a reliable database of violent sexual assault cases that he investigated, studied and analyzed. See *State v. Fortin*, 843 A.2d 974, 1002 (N.J. 2004).

¹³² *State v. Konechny*, 3 P.3d 535, 542 (Idaho Ct. App. 2000) (citations omitted).

¹³³ See Mark Hansen, *Out of the Blue*, A.B.A. J., Feb. 1996, at 50.

¹³⁴ See *id.* To date, West’s testimony is presumably responsible for at least one wrongful conviction, see Steve Cannizaro, *Buras Man May Beat Murder Rap Second Time*, NEW ORLEANS TIMES-PICAYUNE, Dec. 21, 1996, at B1 (discussing how prosecutors refused to retry Tony Keko once a judge ruled West’s testimony inadmissible), and one wrongful accusation, see Marcie Coyle, “Expert” Science Under Fire in Capital Cases, NAT’L L.J., July 11, 1994, at A1 (discussing how prosecutors ultimately dropped charges against Larry Maxwell because of West’s questionable testimony). See also *Banks v. State* 725 So. 2d 711 (Miss. 1997) (overturning Calvin Banks’ capital murder conviction because West destroyed the only piece of physical evidence linking Banks to the murder). Questions have also recently been raised with respect to West’s testimony in Kennedy Brewer’s death penalty case, see *infra* notes 406-09 and accompanying text (discussing Brewer’s questionable capital conviction).

¹³⁵ See Mark Hansen, *Believe It or Not*, A.B.A. J., June 1993, at 64. For instance, Dr. Robbins’s uncanny ability enabled her to describe a 3.5-million-year-old fossilized footprint

Remarkably though, Robbins openly admitted several times that she never took or taught a single course on shoeprint identification techniques or the wear patterns of shoes.¹³⁶ As the United States Supreme Court even noted, Robbins “was allegedly well known for her willingness to fabricate unreliable expert testimony.”¹³⁷ In short, Robbins “helped put people in prison for life, even though she had never actually proved she could match up a single unidentified shoe print with the person who made it.”¹³⁸

Lastly, there are those individuals or institutions that simply cannot be neatly categorized into one area of fraud or misconduct given the scope of their transgressions or incompetence. Fred Zain, the FBI crime lab, and the Houston crime lab represent three such individuals and institutions. By now, the legal and forensic science communities are well aware of Zain’s legendary fraud and ineptitude.¹³⁹ According to an ASCLD investigation, Zain’s deficiencies and misconduct included:

- (1) overstating the strength of results; (2) overstating the frequency of genetic matches on individual pieces of evidence; (3) misreporting the frequency of

as that of a prehistoric woman who was five-and-a-half months pregnant. *See id.* According to Dr. Robbins, “[b]y analyzing the soles of a shoe . . . she [could] determine whether a specific person wore the shoes, based on impressions and wear patterns made by the bones of the foot.” Vicki Quade, *If the Shoe Fits: Footprint Expert Testifies*, A.B.A. J., July 1985, at 34. Moreover, Dr. Robbins routinely claimed that “[f]ootprints [were] better indicators for identifying people than fingerprints,” because “[w]ith . . . footprint[s], you use the entire bottom surface of the foot. With the fingerprint, you only use the tip of the finger.” *Id.* Dr. Robbins also readily admitted that “she [was] the only person in [the] country to attempt [this form] of analysis . . . [in order] to identify the footprints in question.” *State v. Bullard*, 322 S.E.2d 370, 375 n.2 (N.C. 1984); *see also* *People v. Barker*, 170 Cal. Rptr. 69, 72 (Cal. Ct. App. 1981) (“[Dr. Robbins] considered herself the chief proponent of the ‘unique shoeprint’ concept, in that she was the only person presently working on this subject.”). As two forensic practitioners noted, while “Dr. Robbins offer[ed] the idea that . . . footprints are unique with respect to the morphology . . . she le[ft] us without the pertinent information to accept this idea.” M. J. Grubb & C. V. Morton, *Discussion of the Individuality of Human Footprints*, 25 J. FORENSIC SCI. 271, 271 (1980); *see also* Gregory E. Laskowski & Vernon L. Kyle, *Barefoot Impressions—A Preliminary Study of Identification Characteristics and Population Frequency of Their Morphological Features*, 33 J. FORENSIC SCI. 378, 379 (1988) (“[T]here is . . . little or no published data that support [Robbins’] conclusions.”).

¹³⁶ *See, e.g., State v. Ferguson*, 526 N.E.2d 525, 531 (Ill. App. Ct. 1988) (“By her own testimony Robbins stands alone in the anthropological community regarding the belief that an identification can be made solely by measuring and analyzing the wear patterns on the soles of shoes.”); *Bullard*, 322 S.E.2d at 375 n.4 (noting that although Robbins “had never had formal training in the study of footprints, she began collecting footprints and formulating her own study because there was no scientific literature or studies available at that time”).

¹³⁷ *Buckley v. Fitzsimmons*, 509 U.S. 259, 262 (1993).

¹³⁸ FRISBIE & GARRET, *supra* note 3, at 50-51. Robbins’s testimony played a role in one wrongful capital conviction, *see infra* notes 369-75 and accompanying text (discussing Dale Johnston’s wrongful conviction), and one wrongful arrest, *see* FRISBIE & GARRET, *supra* note 3, at 48-51 (discussing Robbins’ involvement in Stephen Buckley’s wrongful arrest for the murder of 11-year-old Jeanine Nicarico).

¹³⁹ *See In re Matter of Investigation of West Virginia State Police Crime Laboratory*, 438 S.E.2d 501 (W. Va. 1993) (discussing Zain’s fraudulent conduct and incompetence).

genetic matches on multiple pieces of evidence; (4) reporting that multiple items had been tested, when only a single item had been tested; (5) reporting inconclusive results as conclusive; (6) repeatedly altering laboratory records; (7) grouping results to create the erroneous impression that genetic markers had been obtained from all samples tested; (8) failing to report conflicting results; (9) failing to conduct or to report conducting additional testing to resolve conflicting results; (10) implying a match with a suspect when testing supported only a match with the victim; and (11) reporting scientifically impossible or improbable results.¹⁴⁰

In all, Zain's conduct played a significant role in at least five wrongful convictions in West Virginia and Texas, the most recent being Bernard Wallace, whose conviction was overturned in September 2003.¹⁴¹

As the Kathleen Lundy incident establishes, the FBI laboratory has also had a plethora of problems. According to a 1997 Inspector General's report, FBI technicians and lab personnel

(1) provided scientifically flawed testimony; (2) offered inaccurate testimony; (3) testified to matters beyond the scope of the examiner's expertise; (4) improperly prepared laboratory reports; (5) neglected to provide sufficient documentation of test results; (6) produced scientifically flawed reports; (7) maintained an inadequate system of record management and retention; (8) failed to resolve serious and credible allegations of incompetence; and (9) continued to staff the explosives unit in a flawed manner.¹⁴²

In March 2003, the Justice Department identified approximately 3,000 pre-1997 criminal cases that potentially could have been negatively impacted by the FBI's misleading testimony and faulty procedures.¹⁴³ In April 2003, the FBI revealed that Jacqueline Blake, a DNA lab technician, repeatedly failed to follow appropriate scientific protocol in at least 103 cases.¹⁴⁴ The first wrongful conviction attributable to the FBI lab scandal was identified in May 2003.¹⁴⁵ Moreover, conceding that examiner Michael Malone provided false and inaccurate testimony in various cases, the government and others are now questioning whether Malone's always-questionable hair testimony placed an innocent person, James Duckett, on Florida's death row.¹⁴⁶ Lastly, in August

¹⁴⁰ *Id.* at 503.

¹⁴¹ *Conviction Based on Zain Testimony Is Overturned*, CHARLESTON GAZETTE & DAILY MAIL (W. Va.), Sept. 20, 2003, at 2A; *see also* NIJ REPORT, *supra* note 76, at 34-35, 48-49, 57, 74-75 (discussing how Zain's incompetence presumably resulted in the wrongful convictions of four men).

¹⁴² *See* OFFICE OF INSPECTOR GENERAL, U.S. DEP'T OF JUSTICE, THE FBI LABORATORY: INVESTIGATION INTO LABORATORY PRACTICES AND ALLEGED MISCONDUCT IN EXPLOSIVE-RELATED AND OTHER CASES (1997).

¹⁴³ *See Errors at F.B.I. May Be Issue in 3,000 Cases*, N.Y. TIMES, Mar. 17, 2003, at 17.

¹⁴⁴ *See* Richard Willing, *Mueller Defends Crime Lab After Questionable DNA Tests*, USA TODAY, May 1, 2003, at 3A. Blake was ultimately fired. *See id.*

¹⁴⁵ *See* John Solomon, *Conviction Overturned in FBI Scandal; The Misconduct of a Lab Scientist Was Cited*, PHILA. INQUIRER, May 28, 2003, at A10 (discussing Anthony E. Bragdon's wrongful conviction).

¹⁴⁶ *See* Edna Buchanan, *Did FBI Help Send Wrong Man to Death Row?*, MIAMI HERALD,

2003, the FBI initiated an internal investigation into the conduct and testimony of Steven Burmeister, the crime lab's chief of scientific analysis during Timothy McVeigh's prosecution. Credible claims have surfaced that Burmeister may have given false testimony about key forensic evidence during McVeigh's trial.¹⁴⁷

Finally, the Houston crime laboratory's incompetence may top them all. According to forensic experts, the lab "has been something akin to a crime lab from hell for the past several years."¹⁴⁸ The lab services Harris County, which has the dubious distinction of being the county that has sent the most defendants to death row in the United States.¹⁴⁹ After a local Houston television station aired an investigative report questioning the lab's quality control measures, an independent audit was conducted.¹⁵⁰ Similar to the Zain and FBI audits, the results were all too familiar. The independent auditors concluded that (1) the lab's personnel lacked necessary training and experience; (2) the lab's facility failed to minimize the possibility of loss or damage of evidence; (3) the lab did not employ proper checks and balances to confirm the quality of examiners' methods and procedures; and (4) the lab was not designed to provide adequate security and minimize contamination.¹⁵¹

At least 1,000 cases, including seventeen death penalty cases, are now under review.¹⁵² Moreover, a DNA wrongful conviction has already been attributed to the lab.¹⁵³ Other Houston Police Department cases have also been called into question.¹⁵⁴ In June 2003, Houston police investigators found evidence of wrongdoing by nine crime lab workers.¹⁵⁵

May 31, 2003, at 1.

¹⁴⁷ See John Solomon, *Crime Lab Chief in Bombing Investigated*, MIAMI HERALD, Aug. 29, 2003, at 3.

¹⁴⁸ Steve McVicker & Roma Khanna, *House Hearings on HPD Crime Lab to Focus on Audit*, HOUS. CHRON., Mar. 3, 2003, at A15. In short, "Legal experts say the laboratory is the worst in the country." Adam Liptak, *Houston DNA Review Clears Convicted Rapist, and Ripples in Texas Could Be Vast*, N.Y. TIMES, Mar. 11, 2003, at A14.

¹⁴⁹ See Liptak, *supra* note 148.

¹⁵⁰ See Peggy O'Hara, *HPD to Review Crime Lab's Work; Investigation by Channel 11 Questioned Whether Errors Led to Jailing of Innocent*, HOUS. CHRON., Nov. 16, 2002.

¹⁵¹ See McVicker & Khanna, *supra* note 148.

¹⁵² See *Independent Inquiry of Crime Lab Needed to Ensure Justice*, AUSTIN AMERICAN-STATESMAN, Apr. 21, 2003, at A6.

¹⁵³ See Liptak, *supra* note 5 (discussing Josiah Sutton's wrongful conviction).

¹⁵⁴ See Roma Khanna, *New DNA Tests Weaken 4 Cases; HPD Shown to Be 'Just Way Off' in One Case; 5 Others Validated*, HOUS. CHRON., Aug. 2, 2003, at 1 (reporting that new DNA tests on evidence from four cases originally processed by the lab found considerably weaker links between the evidence and the defendants than the first results); James Kimberly et al., *HPD Crime Lab Takes Another Hit; Shoddy Handling, Storing of DNA Raise Doubts About Rape Conviction*, HOUS. CHRON., May 10, 2003, at 1 (noting that Ronald Cantrell's sexual assault conviction has raised serious questions because "a private laboratory could not duplicate the results of a DNA test used to imprison [Cantrell] for sexually assaulting an 8-year-old girl"); Steve McVicker, *Retest Casts Doubt on Rape Case; Lack of Male DNA in Evidence Calls Guilty Plea into Question*, HOUS. CHRON., Aug. 15, 2003, at 28 (reporting

Again, the forensic science community's relationship with police and prosecutors is partly accountable for the current state of fraudulent affairs. To begin with, the overwhelming majority of "forensic examinations are conducted in government-funded laboratories, usually located within law enforcement agencies, and typically for the purpose of building a case for the prosecution."¹⁵⁶ As a result, crime lab personnel "may be so imbued with a pro-police bias that they are willing to circumvent true scientific investigation methods for the sake of making their point."¹⁵⁷ Forensic fraud has reached a critical mass simply because "[t]oo many experts in the criminal justice system manifest a police-prosecution bias, a willingness to shade or distort opinions to support the state's case."¹⁵⁸ The influx of fraudulent forensic science have many believing, especially the defense bar, that "[t]here . . . is a pattern nationwide of false, fraudulent, exaggerated, overstated forensic science coming from police crime labs."¹⁵⁹ Before moving on, it needs to be emphasized that forensic science has played a role in numerous injustices around the world. Thus, erroneous and fraudulent forensic science is by no means strictly an American phenomenon.¹⁶⁰

that DNA evidence processed by the lab and used against a man who pled guilty to rape now shows no signs of male DNA).

¹⁵⁵ See *Crime Lab Workers Accused of Wrongdoing*, AP ONLINE, June 4, 2003, available at 2003 WL 56938082.

¹⁵⁶ Thornton & Peterson, *supra* note 40, at 2. Though a recent survey has not been conducted, a 1985 survey revealed that, "Seventy-nine percent of all laboratories . . . [were] located within law enforcement/public safety agencies." Joseph L. Peterson et al., *The Capabilities, Uses and Effects of The Nation's Criminalistics Laboratories*, 30 J. FORENSIC SCI. 10, 11 (1985).

¹⁵⁷ Moenssens, *supra* note 56, at 6.

¹⁵⁸ Giannelli, *supra* note 106, at 441.

¹⁵⁹ *Crime Labs Under Scrutiny Around the US for Producing Evidence That Wrongly Convicted People for Felonies*, NAT'L PUB. RADIO, May 12, 2001 (quoting George Kastell, Chief Public Defender, Charleston, West Virginia).

¹⁶⁰ See, e.g., *Regina v. Ward*, 1 W.L.R. 619 (1993) (discussing Judith Ward's wrongful conviction in England); F. KAUFMAN, *THE COMMISSION ON PROCEEDINGS INVOLVING GUY PAUL MORIN* (1998) (discussing Guy Paul Morin's wrongful conviction in Canada); BROWN & WILSON, *supra* note 106 (discussing wrongful convictions in Australia and New Zealand); ANNE MAGUIRE & JIM GALLAGHER, *MISCARRIAGE OF JUSTICE: AN IRISH FAMILY'S STORY OF WRONGFUL CONVICTION AS IRA TERRORISTS* (1994) (discussing the Maguire family's wrongful convictions in connection with the IRA terrorist bombing attacks); Judy Bourke, *Misapplied Science: Unreliability in Scientific Test Evidence*, 10 AUST. BAR REV. 123, 129-132, 132-34 (1993) (discussing Alice Lynne Chamberlain and Edward Charles Splatt's wrongful convictions in Australia); Kent Roach, *Inquiries into the Causes of Wrongful Convictions*, 35 CRIM. L. BULL. 152, 162 (1999) ("Inaccurate and misleading scientific evidence has contributed to wrongful convictions in the United Kingdom, Australia [and] New Zealand.").

E. *Forensic Science and Questionable Executions: Has Erroneous or Fraudulent Forensic Science Assisted in Executing the Innocent?*

Few errors made by government officials can compare with the horror of executing a person wrongly convicted of a capital crime.¹⁶¹

Legal scholars have continually questioned whether an innocent person has been put to death.¹⁶² This issue has been increasingly addressed over the past two decades given the innumerable problems associated with the capital punishment system.¹⁶³ DNA's exonerative capabilities have only intensified our inquisitiveness regarding this issue.¹⁶⁴ Much of the innocence literature discusses those problematic cases where the defendant's guilt was exceptionally questionable. While a similar format is employed here, the focus will not be entirely on the guilt-innocence issue. Rather, attention is directed at how questionable forensic science presumably assisted prosecutors in creating tenuous perceptions of guilt. After reading this Part, one must question whether the forensic science community acted as an accomplice in three uncertain "legal homicides"—Roger Coleman's, Joseph O'Dell's, and Malcolm Rent Johnson's.

1. *Roger Coleman.*

Roger Coleman was executed in 1992 for Wanda McCoy's 1981 slaying.¹⁶⁵ Coleman was linked to McCoy's death by dubious hair

¹⁶¹ Bedau & Radelet, *supra* note 26, at 22.

¹⁶² The earliest attempt to identify such cases took place in 1912 by the American Prison Congress. See Robert H. Gault, *Find No Unjust Hangings*, 3 J. AM. INST. CRIM. L. & CRIMINOLOGY 131 (1912-1913). According to the Prison Congress, it "carefully investigate[d] every reported case of unjust conviction and tr[ie]d to discover if the death penalty has ever been inflicted upon an innocent man." After studying these cases, the Congress concluded that no innocent individuals had ever been put to death. See *id.*

¹⁶³ For instance, consider the literature over the past decade. See MICHAEL L. RADELET ET AL., *IN SPITE OF INNOCENCE* (1992); Alan W. Clarke et al., *Executing the Innocent: The Next Step in the Marshall Hypothesis*, 26 N.Y.U. REV. L. & SOC. CHANGE 309 (2000); Samuel R. Gross, *The Risks of Death: Why Erroneous Convictions Are Common in Capital Cases*, 44 BUFF. L. REV. 469 (1996); Michael L. Radelet & Hugo Adam Bedau, *The Execution of the Innocent*, 61 LAW & CONTEMP. PROBS. 105 (1998).

¹⁶⁴ DNA "can provide seemingly conclusive proof of innocence." James S. Liebman, *The New Death Penalty Debate: What's DNA Got To Do With It?*, 33 COLUM. HUM. RTS. L. REV. 527, 543 (2002); see, e.g., Gwen Filosa, *Death Row Inmate Innocent, Attorneys Say; DNA Evidence Linked to Another Man*, TIMES-PICAYUNE, Apr. 22, 2003, at 01 (discussing how recent DNA tests raise serious questions about Ryan Matthew's capital conviction); Estes Thompson, *Judge Orders DNA Testing in Pending Execution Case; Lawyer Says Negative Result Could Bolster Claim of Innocence*, CHARLOTTE OBSERVER, Aug. 30, 2003, at 4B (discussing how a judge ordered DNA testing to determine whether Henry Lee Hunt is innocent of capital murder).

¹⁶⁵ Leonard Pitts Jr., *Face the Truth about the Death Penalty*, BALTIMORE SUN, Mar. 16, 2003, at 5C (discussing Coleman's case).

identification evidence. However, as Professor Paul C. Gianelli recently commented, “Serious questions about Coleman’s innocence have been raised,” primarily because “the prosecution’s use of hair evidence was problematic.”¹⁶⁶ John Tucker, a freelance writer, who authored a best-selling book concerning Coleman’s case, described forensic examiner Elmer Gist’s hair testimony in the following manner:

Gist made an effective and persuasive witness as he explained the characteristics of hair, and how hairs are microscopically compared, using a chart he had prepared to illustrate his testimony. Gist’s chart, however, dealt with hair comparison in general. It did not show anything about the hair found on Wanda McCoy, or about Roger Coleman’s hair—and . . . Gist never did present the jury with any enlarged photographs or other depictions of the hairs in question. Nor did he compare the pubic hairs found on Wanda with anyone other than Coleman and Wanda herself—not even her husband Brad. Nevertheless, when he asserted that he had made a comparison of those hairs with Roger’s pubic hair, and that the hairs were “consistent” with each other, meaning, he said, that it was “possible, but unlikely” that the hairs found on Wanda could have come from anyone other than Roger Coleman, the jurors exchanged glances and settled back in their seats.¹⁶⁷

When Coleman’s trial judge was interviewed years later regarding what he perceived to be the most powerful evidence, he stated that it was Gist’s hair testimony.¹⁶⁸ In 2000, eight years after Coleman’s execution, the *Boston Globe* and Centurion Ministries, a nonprofit organization dedicated to exposing wrongful convictions, sought access to the remaining physical evidence in Coleman’s case.¹⁶⁹ Both organizations wanted to perform more sophisticated DNA tests to determine whether Coleman was actually guilty.¹⁷⁰ Despite the persistent whispers of doubt surrounding Coleman’s guilt and execution, the Virginia Supreme Court denied the request in November 2002.¹⁷¹

¹⁶⁶ Paul C. Giannelli & Emmie West, *Forensic Science: Hair Comparison Evidence*, 37 CRIM. L. BULL. 514, 516 (1999).

¹⁶⁷ JOHN TUCKER, *MAY GOD HAVE MERCY: A TRUE STORY OF CRIME AND PUNISHMENT* 76 (1997).

¹⁶⁸ *See id.* at 75. Even though Coleman’s innocence has never been conclusively established, there is undeniable evidence that Elmer Gist’s hair identification testimony in Edward Honaker’s case was clearly wrong. Honaker was convicted on seven counts of sexual assault, rape, and sodomy. At trial Gist testified that a hair found on the victim’s shorts was unlikely to match anyone other than Honaker. Honaker was exonerated in 1994 after DNA tests excluded him as a possible donor. *See* NIJ REPORT, *supra* note 76, at 58. One of the prosecutors who tried Honaker would later concede, “There was no question that [Gist] . . . overstated the distinctiveness of the hair recovered from the victim’s shorts in his trial testimony.” HARLAN LEVY, *AND THE BLOOD CRIED OUT: A PROSECUTOR’S SPELLBINDING ACCOUNT OF THE POWER OF DNA* 153 (1996).

¹⁶⁹ *See* John Aloysius Farrell, *Judge Asked to Save DNA in Capital Case*, BOSTON GLOBE, Sept. 14, 2000, at A5.

¹⁷⁰ *See id.*

¹⁷¹ *See* John Aloysius Farrell, *Court Bars DNA Test in 1981 Killing*, BOSTON GLOBE, Nov. 2, 2003, at A5. Currently, the decision whether to test the physical evidence rests in the hands of Virginia Governor Mark R. Warner. Governor Warner has yet to indicate whether he will

2. *Joseph O'Dell.*

Joseph O'Dell was executed in 1997 for Helen Schartner's 1986 rape and murder in Virginia.¹⁷² O'Dell's 1986 conviction and death sentence rested principally on the state's serology expert. The expert concluded that blood on O'Dell's shirt and jacket was "consistent with" Schartner's.¹⁷³ Because DNA testing was not widely accessible at the time of O'Dell's trial, the expert relied exclusively on a rudimentary blood analysis technique called electrophoresis that compared proteins and enzymes.¹⁷⁴ Even before O'Dell's case, questions were raised concerning the reliability of electrophoretic testing.¹⁷⁵ With respect to O'Dell's case, an independent expert "testified that he was concerned about the reliability of the polymorphic enzyme tests performed by the Commonwealth expert."¹⁷⁶ According to the independent expert, the Commonwealth's expert's "materials disclosed a high test failure rate and that, because the lab notes were 'incomprehensible,' they were virtually impossible for outside review."¹⁷⁷ In regards to her training, the Commonwealth's expert had only two months of experience using the electrophoretic methodology before she performed the analyses in O'Dell's case; nonetheless, she was permitted to perform the tests without supervision.¹⁷⁸ Moreover, in spite of electrophoretic testing's questionable reliability, the expert was allowed to testify that the blood on O'Dell's clothing was consistent with Schartner's, but in attaining this conclusion, the expert never testified as to the (unreliable) procedures she utilized.¹⁷⁹

New DNA tests were performed in 1990. The results, once again, called into question electrophoretic testing's reliability because the blood on O'Dell's shirt was neither his nor Schartner's.¹⁸⁰ The new tests, however, also produced a disputed outcome with respect to the jacket stain. The state asserted (and still

test the evidence. See Jerry Markon, *Warner Is Asked to Order DNA Test on Executed Man*, WASH. POST, Feb. 28, 2003, at B5.

¹⁷² See *Afraid of a Shadow of a Doubt*, WASH. POST, May 7, 2000, at B8.

¹⁷³ *Id.* O'Dell claimed that on the night of the murder he was involved in a fistfight and the blood on his clothing came from the fight.

¹⁷⁴ See Lori Urs, *Commonwealth v. Joseph O'Dell: Truth and Justice or Confuse the Courts? The DNA Controversy*, 25 NEW ENG. J. ON CRIM. & CIV. CONFINEMENT 311, 319 (1999). Electrophoresis is a "technique for the separation of molecules through their migration on a support medium while under the influence of an electrical potential." RICHARD SAFERSTEIN, *CRIMINALISTICS: AN INTRODUCTION TO FORENSIC SCIENCE* 131 (7th ed. 2001). As in O'Dell's case, in the forensic context, "electrophoresis finds its most successful application in the characterization of proteins and DNA in dried blood." *Id.*

¹⁷⁵ See Randolph N. Jonakait, *Will Blood Tell? Genetic Markers in Criminal Cases*, 31 EMORY L.J. 833 (1982) (discussing electrophoretic testing's questionable reliability).

¹⁷⁶ Urs, *supra* note 174, at 319.

¹⁷⁷ *See id.*

¹⁷⁸ *See id.*

¹⁷⁹ *See id.*

¹⁸⁰ See *Afraid of a Shadow of a Doubt*, *supra* note 172.

does) that the jacket stain matched the victim's blood, while O'Dell argued that, at best, it was inconclusive. After an evidentiary hearing, a federal judge held that the jacket test was inconclusive. Nevertheless, the judge still refused O'Dell's habeas request, holding that O'Dell's alleged confession was adequate to sustain his conviction.¹⁸¹

As in Coleman's case, various advocacy groups sought access to the seminal fluid evidence so that more advanced and discriminatory DNA testing could be performed.¹⁸² The Circuit Court of Virginia Beach denied the request.¹⁸³ On appeal, the Virginia Supreme Court affirmed.¹⁸⁴ Once the State received the Virginia Supreme Court's approval, it destroyed the evidence.¹⁸⁵ In the end, as some have suggested, "[w]ithout the erroneous blood testimony and the false claim that he had confessed, O'Dell probably would not have been convicted."¹⁸⁶

3. *Malcolm Rent Johnson.*

Malcolm Rent Johnson was executed in 2000 for Ura Thompson's 1981 rape and murder in Oklahoma City.¹⁸⁷ Johnson was arrested on the same day of the murder on an unrelated weapons charge. In his apartment, officers discovered two sets of keys, a wristwatch, a necklace, and a hand-painted vase; all items that allegedly belonged to the victim. Johnson, who was cognitively impaired, claimed that he received the stolen items from a third party. The keys, wristwatch, and necklace only placed Johnson at the scene of the rape-murder circumstantially. To more definitively place Johnson at the scene during the murder, prosecutors called on Joyce Gilchrist. Gilchrist testified that she found semen on a bedspread and a pillowcase in the victim's bedroom that was consistent with Johnson's blood type. Gilchrist also testified that hairs found at the apartment matched Johnson. In particular, Gilchrist stated that a

¹⁸¹ See *id.* At trial, "the state had presented the testimony of Steven Watson, a jailhouse informant who claimed that O'Dell confessed to Schartner's rape and murder while the two shared a jail cell. In 1996, Watson gave a statement under oath in which he admitted that his trial testimony was false and that O'Dell had, in fact, never confessed to him." Anne-Marie Moyes, *Assessing the Risk of Executing the Innocent: A Case for Allowing Access to Physical Evidence for Posthumous DNA Testing*, 55 VAND. L. REV. 953, 955 (2002).

¹⁸² See *id.* at 955-56. When the post-conviction DNA testing was originally performed, efforts were made to test semen found on a vaginal swab taken at the victim's autopsy. The testers reported, however, that there was insufficient material to obtain a conclusive result. See *id.* at 955-57.

¹⁸³ See *id.* at 957.

¹⁸⁴ See Laurence Hammack, *Ministry Asks Judge to Block Evidence from Being Mailed*, ROANOKE TIMES & WORLD NEWS, Sept. 19, 2000, at B1.

¹⁸⁵ See Moyes, *supra* note 181, at 958.

¹⁸⁶ John C. Tucker, *A Look at Executions; What's Wrong With Making Sure?*, WASH. POST, July 20, 1997, at C03.

¹⁸⁷ See Deborah Hastings, *Fair Trial Questions Follow Man's Execution*, TELEGRAPH HERALD (Dubuque, Iowa), Nov. 4, 2001, at A6.

blue coloration on the hairs matched cotton fibers collected from Johnson's shirt.¹⁸⁸

Because Johnson was denied funding for experts, Gilchrist's lab work went unexamined for nearly twenty years. However, when Doug Parr, a private attorney who took up Johnson's cause after the Gilchrist scandal broke, came across a July 2001 internal crime lab memo, he was shocked by its contents. According to the memo, an Oklahoma City crime lab chemist who reevaluated the evidence in Johnson's case could find no trace of semen on any of the remaining evidence.¹⁸⁹ Moreover, two forensic experts hired by the defense were critical of Gilchrist's blue-coloration testimony. In 1997, Dr. Peter R. DeForest commented that, "An assessment such as this has little value due to the ubiquitous nature of blue cotton."¹⁹⁰ From Dr. DeForest's perspective, it was very "doubtful" that Gilchrist could have matched the shirt with only the blue-tinged hairs.¹⁹¹ Dr. DeForest added that Gilchrist's testimony had the effect of confounding and confusing the jury.¹⁹²

F. Recent Crime Lab Mishaps: Questioning the Reliability of Crime Labs

Within the past year, crime labs in Florida, Arizona and Texas have been exposed for issuing false reports on DNA, blood samples and other critical evidence. Wrongful convictions in rape and murder cases have been overturned as a result.¹⁹³

As the *Los Angeles Times* recently noted, "A series of scandals, probes and new questions about old convictions are casting doubt on one of the foundations of the modern criminal justice system—the crime lab."¹⁹⁴ For instance, consider some of the recent crime lab problems:

California crime labs: In 1997 independent experts discovered that the California Department of Justice's crime labs were in appalling condition.¹⁹⁵

¹⁸⁸ Johnson's trial, ironically, was the first time Gilchrist provided hair and fiber testimony. See Deborah Hastings, *Police Memo: Evidence Nonexistent; Chemist's Testimony Led to Okla. Execution*, CHARLESTON GAZETTE (W. Va.), Aug. 30, 2001, at 9A.

¹⁸⁹ See Henry Weinstein, *Evidence Questioned in Execution, Police Memos Contradict Chemist's Forensic Testimony at a 1982 Oklahoma City Murder Trial*, L.A. TIMES, Aug. 30, 2001, at A15.

¹⁹⁰ Yardley, *supra* note 130.

¹⁹¹ *Id.*

¹⁹² See *id.*

¹⁹³ Editorial, *Tougher Penalties for Abuses Can Protect the Innocent*, USA TODAY, July 14, 2003, at 10A.

¹⁹⁴ Robert Tanner, *Crime Labs Stained by a Shadow of Doubt*, L.A. TIMES, July 13, 2003, at A18; see also Robert Tanner, *Standards, Autonomy Sought for Crime Labs Mishandling of Evidence; Mismanagement Cited*, SEATTLE TIMES, July 7, 2003, at A1 (discussing recent crime lab quandaries).

¹⁹⁵ See CAL. DEP'T. OF JUSTICE, FORENSIC LABORATORIES REPLACEMENT PROGRAM, NEEDS ASSESSMENT REPORT FOR THE SANTA ROSE FORENSIC LABORATORY 1.1-1.6 (1997), available at <http://www.kruglaw.com/dojrpt.htm>.

Moreover, in 1998 the California Bureau of State Audits found that the vast majority of the DOJ's nineteen local crime labs did not have quality control systems and proficiency testing programs. They also determined that the labs' in-house training programs were poorly structured and administered and that their equipment was obsolete or malfunctioning.¹⁹⁶

West Virginia crime lab: Besides the Fred Zain scandal, the West Virginia crime lab has had other instances of fraud. For instance, a civilian lab technician pled guilty to fraud for falsely reporting results of drug analysis tests he never conducted.¹⁹⁷ A police sergeant working in the lab was fired because he periodically failed to conduct preliminary tests required by lab policy.¹⁹⁸

Ventura County Sheriff's Department crime lab: The Ventura crime lab botched a law student's blood test in a July 2003 DUI case and then neglected to contact her after a retest demonstrated that she was not intoxicated when arrested. The law student's blood sample was negligently swapped with that of another driver whose blood-alcohol content was more than double the legally permissible limit of .08%.¹⁹⁹

Illinois State Police crime lab: A forensic scientist at the crime lab committed what many forensic experts describe as an astonishing error: contaminating a semen smear on a microscope slide by somehow transferring his own DNA into the evidence. The contamination most likely occurred because the forensic scientist was not wearing gloves when he conducted the analysis, transgressing elementary laboratory protocol for DNA testing. The mistake cost Anselm Holman, a convicted rapist, a chance to prove his innocence.²⁰⁰

Philadelphia crime lab: The Philadelphia crime lab recently conceded that it inadvertently switched DNA samples of a defendant and victim in a 1999 rape case. The lab initially concluded that the defendant could be a contributor to what lab analysts described as "seminal stains" on the victim's clothing. The lab also reported that the defendant's DNA was extracted from vaginal swabs. After the erroneous swap came to light, the lab retested the evidence and concluded that the "seminal stains" were actually bloodstains that matched the victim's DNA, not the defendant's. The retests also established that the defendant was not linked to the vaginal swab.²⁰¹

¹⁹⁶ See CAL. BUREAU OF STATE AUDITS, FORENSIC LABORATORIES: MANY FACE CHALLENGES BEYOND ACCREDITATION TO ASSURE THE HIGHEST QUALITY SERVICES 1-3 (1998), available at <http://www.bsa.ca.gov/bsa/pdfs/97025.pdf>.

¹⁹⁷ See Lawrence Messina, *Another Shake-up at State Police Lab: Sergeant Fired; Captain Resigns*, CHARLESTON GAZETTE (W. Va.), May 25, 2002, at 1A.

¹⁹⁸ See *id.*

¹⁹⁹ See Daryl Kelley, *Crime Lab Errs in DUI Tests*, L.A. TIMES, Feb. 5, 2004, at B1.

²⁰⁰ See Ken Armstrong & Steve Mills, *DNA Sample Error Puts Case on Line, Lab on Spot*, CHI. TRIB., July 27, 1999, at 1.

²⁰¹ See William C. Thompson et al., *How the Probability of a False Positive Affects the Value of DNA Evidence*, 48 J. FORENSIC SCI. 47 (2003).

Phoenix crime lab: In Phoenix, technicians considerably overstated the probability that a suspect's genetic material was present on evidence in nine criminal cases.²⁰²

Las Vegas crime lab: At the Las Vegas crime lab, a technician's clerical error resulted in illegitimate charges being brought against an innocent person.²⁰³ Likewise, an erroneous fingerprint identification by a Las Vegas lab examiner led to a woman's family being notified that she was a homicide victim; she turned up alive and well five weeks later.²⁰⁴

Broward County Sheriff Department crime lab: In Broward County, Florida, prosecutors were forced to drop a first-degree murder charge after a crime lab analyst contaminated the DNA evidence in the case.²⁰⁵

Indianapolis-Marion County Forensic Services Agency: In Indianapolis, numerous cases have been called into question because a DNA technician bypassed crucial steps that would have verified the accuracy of his work.²⁰⁶ Additionally, a senior scientist at the crime lab recently claimed that his superiors conspired to hide major abuses concerning the lab's DNA section.²⁰⁷

Kansas Bureau of Investigation crime lab: At the KBI, mislabeling of a blood sample twelve years ago in a rape case freed a man who was charged in a murder and a series of subsequent rapes.²⁰⁸

Fort Worth crime lab: In Fort Worth, a senior forensic scientist was fired for failing a proficiency test covering forensic science knowledge and laboratory practices and for submitting a DNA analysis report whose results could not be confirmed by prosecutors in a death penalty case.²⁰⁹

²⁰² See Susan Carroll & Carol Sowers, *DNA Flaws Called Unlikely to Jeopardize Police Cases*, ARIZ. REP., May 7, 2003, at 1B.

²⁰³ See Keith Paul, *Audit Calls for Changes in Police DNA Lab*, LAS VEGAS SUN, May 23, 2003, at 1 (noting how Lazaro Sotolusson was wrongly charged with two rapes because a technician placed Sotolusson's name on another man's DNA profile).

²⁰⁴ See Michael Coit, *Santa Rosa Woman Identified as Vegas Slaying Victim Turns up Alive*, PRESS DEMOCRAT, Sept. 13, 2002, available at <http://www.latent-prints.com/press%20demo.htm> ("Kathleen Hatfield is alive after all, living on the streets of Santa Rosa five weeks after Las Vegas police identified her as the victim of an apparent homicide."). The *San Francisco Chronicle* pronounced Hatfield's supposed death. See *Santa Rosa Woman's Body Found in Desert*, SAN. FRAN. CHRON., Aug. 8, 2002, at A18 ("Las Vegas police homicide Sgt. Kevin Manning said he alerted the Sonoma County Sheriff's office after Kathleen Hatfield's body was identified from her tattoos and fingerprints." (emphasis added)).

²⁰⁵ See Paula McMahon, *Crime Lab Botches Murder Inquiry; Prosecutors Must Drop Charges After DNA Evidence Is Contaminated*, SUN-SENTINEL (Fort Lauderdale, Fla.), June 24, 2003, at 1A.

²⁰⁶ See Vic Ryckaert, *Crime Lab Tech Was Disciplined; Murder Case DNA Testing Questioned*, INDIANAPOLIS STAR, July 19, 2003, at 1A.

²⁰⁷ See Vic Ryckaert, *Crime Lab Cover-Up Alleged*, INDIANAPOLIS STAR, Dec. 25, 2003, at 1B.

²⁰⁸ See Associated Press, *Kansas Crime Lab's Error Was Deadly, Official Says; Man Freed by '91 Mistake Now Held in 7 Rapes, Murder*, CHI. TRIB., June, 6, 2003, at 17.

²⁰⁹ See Deanna Boyd, *Scientist at Crime Lab Is Fired*, FT. WORTH STAR-TELEGRAM, Apr. 22,

Colorado Bureau of Investigation crime lab: A recent audit of the CBI lab revealed numerous operational shortcomings. The audit noted that the lab's working environment was so limited that cross-contamination of evidence could easily occur.²¹⁰

Pennsylvania State Police crime lab: In Pennsylvania, a state police forensic scientist was found to have missed evidence when conducting her analyses, calling into question 615 criminal cases statewide.²¹¹

Florida Department of Law Enforcement Crime Lab: In Florida, an FDLE DNA analyst failed a proficiency test and, after realizing he had failed, switched samples and falsified data to cover it up.²¹²

Again, by no means are crime lab mishaps exclusively an American problem. Crime labs across the world have experienced similar misfortunes.²¹³

G. *Confronting the Reality: A Broken System Supporting Another Broken System*

I don't think anyone can tell you what's really going on The truth is, we don't know.²¹⁴

The research unquestionably indicates that forensic science is continually inching its way toward surpassing eyewitness misidentification as the foremost factor in wrongful convictions. Accordingly, in its more than one hundred year history the forensic science community has never been viewed so skeptically by the courts²¹⁵ and negatively by the news media as it is today.²¹⁶ For

2003, at 1. With respect to the DNA report see *infra* notes 282-85 and accompanying text.

²¹⁰ See Editorial, *CBI Lab Woes Dangerous*, DENVER POST, Aug. 21, 2003, at B08.

²¹¹ See Keith Herbert & Jeff Shields, *Troopers List Cases Possibly Tainted: A Scientist Whose Work Has Been Questioned Analyzed the Evidence in the Prosecutions*, PHILA. INQUIRER, June 20, 2003, at B01.

²¹² See Rene Stutzman, *State DNA Analyst's Data Forgeries Could Result in New Trial for Rapist*, ORLANDO SENTINEL, July 25, 2002, at A1.

²¹³ See, e.g., KAUFMAN, *supra* note 160 (discussing the problems at Canada's Centre for Forensic Sciences); Gary Tippet, *Jaidyn Evidence Contaminated, Says Forensic Expert*, THE AGE (Melbourne), Feb. 4, 2004, at 8 (noting that clothing found with a murdered infant "was cross-contaminated with the DNA from a rape victim during a mix-up at the Victoria Police Forensic Services Centre").

²¹⁴ Judith Graham, *Crime Labs Contaminate Justice; Poor Science, Quality Control Jailing Innocents*, CHI. TRIB., June 21, 2001, at 10 (quoting Barry Fisher, crime lab director for the Los Angeles County Sheriff's Department).

²¹⁵ See, e.g., *United States v. Mikos*, No. 02 CR 137, 2003 WL 22922197 (N.D. Ill. Dec. 9, 2003) (excluding comparative bullet lead analysis testimony); *United States v. Brewer*, No. 01 CR 892, 2002 WL 596365 (N.D. Ill. Apr. 16, 2002) (excluding handwriting); *United States v. Saelee*, 162 F. Supp. 2d 1097 (D. Alaska 2001) (excluding handwriting); *United States v. Fujii*, 152 F. Supp. 2d 939 (N.D. Ill. 2000) (excluding handwriting); *United States v. Rutherford*, 104 F. Supp. 2d 1190, 1194 (D. Neb. 2000) (excluding handwriting); *United States v. Santillan*, No. CR-96-40169 DLJ, 1999 WL 1201765 (N.D. Cal. Dec. 3, 1999) (excluding handwriting); *United States v. Hines*, 55 F. Supp. 2d 62 (D. Mass. 1999) (excluding handwriting); *Ramirez v. State*, 810 So. 2d 836 (Fla. 2002) (excluding knife

example, fingerprints, which have historically been the most trusted form of physical evidence, are even under severe attack.²¹⁷ Forensic scientists have also begun to question the community's scientific status.²¹⁸

Lawyers can no longer ignore the obvious. The forensic science community's infrastructure, regulation (or lack thereof), unrealistic expectations, and lack of funding, create an atmosphere where convicting the innocent, especially in capital cases, is not "an unreal dream."²¹⁹ Consequently, as an ex-Oklahoma prosecutor stressed, "We have used for the last 25 years bad science . . . to convict people, and we have stretched the truth It's got to stop."²²⁰ More importantly, as one state senator recently conceded, "Reforms in

identification); *State v. Fortin*, 843 A.2d 974, 1002 (N.J. 2004) (reversing death sentence and conviction because state's criminal profiler should not have been permitted to testify on violent sexual crimes without producing a reliable database of violent sexual assault cases that he had investigated, studied, or analyzed); *State v. Jones*, 541 S.E.2d 813 (S.C. 2001) (excluding footprint identification); *State v. Stevens*, 78 S.W.3d 817 (Tenn. 2002) (excluding ex-FBI profiler's testimony); *State v. Kunze*, 988 P.2d 977 (Wash. Ct. App. 1999) (overruling a trial court decision permitting earprint identification).

²¹⁶ See, e.g., Laurie P. Cohen, *'Scared of Science': Crime Labs' Work Is Rarely Challenged by Defense Lawyers*, WALL ST. J., July 22, 1997, at A1 ("Almost every felony prosecution in the nation relies on forensics Yet never before has the *credibility of such evidence fallen so low.*" (emphasis added)); Bruce Fein, *Some Deserve Death Penalty*, USA TODAY, May 16, 2001, at 14A ("Prosecution forensic experts, such as the recently exposed Joyce Gilchrist in Oklahoma, are too often inexpert."); Paul Craig Roberts, *System of Injustices*, WASH. TIMES, Dec. 26, 2001, at A12 ("Forensic evidence, once thought to be conclusive, has turned out to be unreliable and fraudulent."); *Whose Body of Evidence?*, ECONOMIST, July 11, 1998 at 78 ("Good science does . . . aim to tell the truth. Just as important, it knows and admits when it is baffled or uncertain. But in the past few years, questions have been raised about whether forensic science counts as 'good science.' And the answer that keeps coming back is: *frequently it does not.*" (emphasis added)).

²¹⁷ See *United States v. Crisp*, 324 F.3d 261, 272-73 (4th Cir. 2003) (Michaels, J., dissenting); *United States v. Plaza*, 179 F. Supp. 2d 492 (E.D. Pa. 2002) (barring fingerprint examiner from testifying as to individuality); Robert Epstein, *Fingerprints Meet Daubert: The Myth of Fingerprint "Science" Is Revealed*, 75 S. CAL. L. REV. 605 (2002) (questioning fingerprinting's scientific foundation).

²¹⁸ See, e.g., INMAN & RUDIN, *supra* note 54, at 94 (arguing that Locard's Exchange Principle has been accepted without proof); Bowers, *supra* note 66, at 246 ("[F]orensic odontology rests on a fragile foundation of minimally relevant empirical research."); Sargur N. Srihari et al., *Individuality of Handwriting*, 47 J. FORENSIC SCI. 856 (2002) ("[T]he individuality of writing in handwritten notes and documents has not been established with scientific rigor."); David A. Stoney, *The Scientific Status of Expert Testimony on Fingerprint Identification*, in SCIENCE IN THE LAW: FORENSIC SCIENCE ISSUES 82, 99 (David L. Faigman et al. eds., 2002) (arguing that fingerprint identifications "are the product of probabilistic intuitions widely shared among fingerprint examiners, not of scientific research"); John I. Thornton, *Courts of Law v. Courts of Science: A Forensic Scientist's Reaction to Daubert*, 1 SHEPARD'S EXPERT & SCI. EVIDENCE Q. 475, 482 (1994) ("A number of [forensic science] tests . . . have marked empirical validity but precious little scientific foundation."); William A. Tobin & Wayne Duerfeldt, *How Probative Is Comparative Bullet Lead Analysis?*, 17 CRIM. JUST. 26 (2002) (questioning the scientific veracity of comparative bullet lead analysis).

²¹⁹ *United States v. Garsson*, 291 F. 646, 649 (S.D.N.Y. 1923).

²²⁰ Graham, *supra* note 214 (quoting James Bednar, head of Oklahoma's Indigent Defense System and former assistant state attorney general under three administrations).

this area are desperately needed and long overdue.”²²¹ Reform must begin now, before someone is erroneously sentenced to death and then actually put to death, if it has not yet happened.²²² With this in mind, Part III will articulate various forensic science reforms that are aimed at enhancing the community’s precision and legitimacy. Improving the forensic science community’s work product and integrity will substantially improve the capital punishment (and criminal justice) system’s accuracy and fairness.

III. SUGGESTED REFORMS: INCREASING MONEY, SCIENTIFIC KNOWLEDGE, AND SCIENTIFIC RESEARCH

If you’re not going to address the problems in your own profession, why be in it?²²³

To effectively convey why the suggested reforms are needed, the following format will be employed. First, a problem that has repeatedly surfaced within the forensic science community will be identified. Second, a concrete illustration of how this problem has generated an injustice or negatively affected the investigative or trial processes will be provided. Lastly, the suggested reform will be articulated followed by supplemental bits of information reinforcing why the reform should be implemented. To be clear, however, the following reforms should not be construed to be exhaustive.

Problem #1: Antiquated crime lab technology and understaffed crime labs. A prime example is when Washington D.C.’s forensic technician team was embarrassed and criticized for failing to discover any significant evidence with respect to Chandra Levy’s disappearance. Private investigators working for Levy’s family discovered her leg bone in a park after the D.C. unit had combed the area for roughly a week. The Levy discovery prompted a second search that led to the detection of additional bones, which in turned “raised questions about the competence of the city’s forensic team.”²²⁴ An examination of the forensic

²²¹ Rick Klein, *Senate Leaders Seeking Increase for Crime Lab*, May 14, 2003, BOSTON GLOBE, at B4 (quoting State Senate President Robert E. Travaglini of Massachusetts).

²²² See Bourke, *supra* note 160, at 195 (“The urgent need to legislate for [forensic] scientific standards is apparent to many.”); Associated Press, *Bill Would Create Forensic Science Oversight Board, Legislation Also Nixes Lifetime Appointment of Director*, COLUMBUS LEDGER-ENQUIRER (Ga.), Mar. 20, 2002, at 10 (discussing a bill reforming the Alabama Department of Forensic Sciences); W. Mark Dale, *Crime Bill Should Focus on Forensic Science (Letter to the Editor)*, WALL ST. J., Mar. 1, 1995, at A15 (arguing for increased federal funding of forensic sciences).

²²³ Bill Hewitt & Carol Rust, *Undone by DNA; A Whistleblower Exposes Sloppy Work at a Houston Crime Lab, Freeing One Prisoner—and Perhaps Many More*, PEOPLE, May 19, 2003, at 147 (quoting the response of Dr. Elizabeth Johnson, a former employee in the Houston crime lab and the whistleblower in the scandal).

²²⁴ Allan Lengel & David A. Fahrenthold, *Staffing, Training of D.C. Crime Unit Criticized; Investigators Also Do Without Needed Forensic Equipment*, WASH. POST, July 13, 2002, at B05.

unit revealed that the unit was understaffed and inadequately trained, employed antiquated tools, and lacked essential equipment such as “high-quality flashlights, advanced blood-testing materials and power tools to cut through floors and other surfaces.”²²⁵

Suggested Reform: Increased funding for crime lab modernization. Over the past decade much of the attention directed toward crime laboratories has not focused on their scientific capacities but rather their financial incapacities.²²⁶ Improving and expanding forensic science services are costly endeavors.²²⁷ A 1999 study revealed that an additional 9,000 forensic scientists are needed to properly staff the nation’s laboratories; these hirings would cost more than \$650 million. Moreover, \$1.3 billion is required for satisfactory laboratory facilities, and \$285 million is needed to purchase equipment necessary to analyze submitted evidence.²²⁸ In most states and municipalities, though, forensic science funding has failed to keep pace with the increased demand for quality forensic science laboratories and practitioners.²²⁹ Lastly, certain legislation has economically impacted, in a negative manner, the nation’s crime laboratories.²³⁰

Lawmakers are just now realizing the deplorable conditions of the nation’s crime laboratories. This awareness has generated economic support from state and federal lawmakers.²³¹ Besides the FBI’s new \$130 million crime laboratory

²²⁵ *Id.*

²²⁶ See, e.g., Rhonda Cook, *Staff Shortage Slows Work at Crime Lab*, ATLANTA J.-CONST., July 30, 2003, at B1; *Crime Labs Get Ignored and Criminals Go Free*, USA TODAY, Aug. 22, 1996, at 12A; Peter Eisler, *Calif.’s Crisis in a Word: O.J. Labs Point to Case in Their Campaign for More Funding*, USA TODAY, Aug. 20, 1996, at 7A; Tomas Guillen & Eric Nalder, *Overwhelming Evidence—Crime Labs in Crisis*, SEATTLE TIMES, June 19-23, 1994 (five-part series); Nancy Lofholm, *Funding Cutbacks Add to CBI’s Worries Lab Tests, Gun Checks Face Greater Delays*, DENVER POST, June 9, 2003, at B01.

²²⁷ For instance, consider the recent statement by Los Angeles County District Attorney Steve Cooley: According to Cooley, “[P]lans for a \$96-million regional crime lab are grossly inadequate and threaten to expand a backlog of unsolved murder and sexual assault cases.” Anna Gorman, *Cooley Labels Crime Lab Plans Inadequate*, L.A. TIMES, May 22, 2002, at 3 (emphasis added).

²²⁸ See NATIONAL INSTITUTE OF JUSTICE, FORENSIC SCIENCES: REVIEW OF STATUS AND NEEDS (1999).

²²⁹ See *DNA Crime Labs: The Paul Coverdell National Forensic Sciences Improvement Act: Hearing Before the House Financial Services Committee*, 107th Cong. (2001) (statement of Keith Kenneth Coonrod, Chair, Consortium of Forensic Science Organizations) (“[T]he use of forensic science by the criminal justice system has increased dramatically over the past several years but our funding has not.”).

²³⁰ See, e.g., Pam Easton, *New Law Puts Crime Labs in Bind*, FT. WORTH STAR-TELEGRAM, Sept. 1, 2003, at 6; Ralph K.M. Haurwitz, *Medical Examiners Resist DPS Proposal Agency Says New Law Will Tighten Standards Some Pathologists Say It’s Full of Problems*, AUSTIN AMERICAN-STATESMAN, Sept. 29, 2003, at A1.

²³¹ See *Funding Forensic Sciences: DNA and Beyond: Hearing Before the Senate Judiciary Committee*, 108th Cong. (2003) (statement of Sarah V. Hart, Director, National Institute of Justice) (noting that the federal government will allocate \$90.4 million in 2004 “to increase forensic laboratory capacity at the State and local levels”).

complex,²³² various counties, cities, and states have already built new facilities, are in the process of constructing new labs, have passed legislation approving the necessary funding for new facilities, or have increased the state's forensic science budget.²³³

Problem #2: Massive DNA Backlogs. DNA backlogs can create injustices in two manners. First, they can permit a serial offender to elude detection for many months if not years. For instance, suspected serial killer Derrick Todd Lee's 2001 DNA sample took over twenty months to test. During this time he purportedly committed several more murders.²³⁴ Second, DNA backlogs can delay an innocent person's exoneration. For example, Raymond Holder attempted suicide after serving a year in a Virginia jail for a rape he did not commit. The DNA test that eventually proved his innocence usually took only two days to complete.²³⁵

Suggested Reform: Increased funding for DNA testing. When DNA testing was introduced into the criminal justice system, it was heralded as the "single greatest advance in the 'search for truth,' and the goal of convicting the guilty and acquitting the innocent, since the advent of cross-examination."²³⁶ Given its crime fighting potential²³⁷ and its exonerative capacities,²³⁸ DNA technology has become increasingly vital to ensuring accuracy and fairness in the criminal justice system. Unlike other forensic identification methods, DNA has demonstrated, beyond reproach, the extraordinary degree of imperfection that subsists in the factfinding processes upon which the criminal justice system so heavily relies. Unfortunately, justice and precision are routinely jeopardized in

²³² See Dan Eggen, *FBI Laboratory Moves to New Home; Quantico Facility Opens Today*, WASH. POST, Apr. 25, 2003, at A21.

²³³ See, e.g., Troy Anderson, *Cutting-Edge Techniques Doing Justice to Crime Lab*, L.A. DAILY NEWS, July 2, 2003, at N4 (discussing Los Angeles County and City's new \$96 million crime lab); Keiko Morris, *Nassau Unveils New DNA Laboratory; Suozzi Promises Better Service for Less Money*, NEWSDAY (N.Y.), Aug. 1, 2003, at A29 (discussing the new DNA crime lab for Nassau County, New York); Ray A. Smith, *DNA Paves Way for Crime-Lab Makeovers*, WALL ST. J., Apr. 2, 2003, at B6 (discussing New York City's newly approved \$174 million crime lab).

²³⁴ See Stephanie A. Stanley, *DNA Test Came 20 Months Late; Lee's 2001 Arrest Fell Through the Cracks*, TIMES-PICAYUNE (New Orleans, LA), June 3, 2003, at 1.

²³⁵ See Becky Beaupre, *Backlogged Labs Put Justice on Hold*, USA TODAY, Aug. 20, 1996, at 7A.

²³⁶ *People v. Wesley*, 533 N.Y.S.2d 643, 644 (N.Y. Crim Ct. 1988).

²³⁷ See Dawn Bormann & Richard Espinoza, *Science Drives Crime-Fighting Forward: Some Fear DNA Use Will Go Too Far*, KAN. CITY STAR, Aug. 10, 2003, at A1 ("DNA testing holds enormous promise for police.").

²³⁸ See Bill Janz, *Struggling with Knowledge She Identified the Wrong Man*, MILWAUKEE J. SENTINEL, Sept. 21, 2003, at 1A (discussing Steven Avery's DNA exoneration); Patrice O'Shaughnessy, *DNA Opens Prison Cell After 12 Years; Cleared in Rape & Starting Over*, N.Y. DAILY NEWS, Aug. 31, 2003, at 8 (discussing Michael Mercer's DNA exoneration); Henry Weinstein, *DNA Frees Man Jailed for 22 Years*, L.A. TIMES, Sept. 20, 2003, at 11 (discussing Calvin Willis' DNA exoneration).

cases where DNA evidence is available simply because many crime labs lack the faculties to analyze the evidence in a timely manner. In March 2003, the National Institute of Justice estimated that there were more than 350,000 untested DNA samples nationwide.²³⁹ The number of backlogged DNA cases has been steadily increasing for the past five years.²⁴⁰

Four reasons exist why this number has been escalating. First, a growing number of law enforcement agencies have developed “cold-case” squads to reevaluate unsolved rape and homicide cases.²⁴¹ Second, given the increasing number of wrongful convictions, more states are enacting statutes that provide for postconviction DNA testing.²⁴² Third, laws requiring arrestees or criminal defendants to submit DNA samples have placed an inordinate amount of stress on crime laboratories.²⁴³ Lastly, there is a shortage of trained forensic scientists to perform the growing number of DNA analyses.²⁴⁴

Again, it appears as if lawmakers are finally recognizing the need for increased DNA funding.²⁴⁵ The most important economic contribution came in March 2003 when the Bush administration asked Congress for \$1 billion over the next five years to expand DNA testing and to improve DNA technology.²⁴⁶

Problem #3: Pro-prosecution and law-enforcement bias. Former Pennsylvania State Police forensic chemist Janice Roadcap’s questionable

²³⁹ See NATIONAL INSTITUTE OF JUSTICE, REPORT TO THE ATTORNEY GENERAL ON DELAYS IN FORENSIC DNA ANALYSIS (2003) [hereinafter REPORT ON DELAYS].

²⁴⁰ The Bureau of Justice Statistics found that between 1997 and 2000, DNA laboratories experienced a 135% increase in backlogs. NATIONAL INSTITUTE OF JUSTICE, ADVANCING JUSTICE THROUGH DNA TECHNOLOGY (2003).

²⁴¹ See NATIONAL INSTITUTE OF JUSTICE, USING DNA TO SOLVE COLD CASES (2002); Sheila McLaughlin, *Cold-Case Squad in Business*, CINN. ENQUIRER, Apr. 21, 2003, at 1A.

²⁴² Twenty-nine states and jurisdictions have such statutes. See, e.g., ARIZ. REV. STAT. § 13-4240 (2001); CAL. PENAL CODE § 1405 (West Supp. 2004).

²⁴³ Currently, all fifty states and the federal government have laws requiring that DNA samples be collected from certain categories of offenders. See REPORT ON DELAYS, *supra* note 239.

²⁴⁴ See *id.* The shortage can be attributed to the fact that, “Public crime lab salaries are often below the salaries paid by the private sector.” *Id.* at 2; see also *Public Safety Chief Cites Salaries in Forensic Labs*, CHARLESTON GAZETTE & DAILY MAIL (W. Va.), Aug. 5, 2003, at 3A (discussing how low salaries have caused problems with recruitment and retention at the West Virginia crime lab).

²⁴⁵ For instance, in 2000 Congress passed the DNA Analysis Backlog Elimination Act, Pub. L. No. 106-546, 114 Stat. 2726 (2000), and the Paul Coverdell National Forensic Sciences Improvement Act, Pub. L. No. 106-561, 114 Stat. 2787 (2000), which together authorized an additional \$908,000,000 over six years in DNA-related grants. See also Innocence Protection Act, S. 486, 107th Cong. (2001); *Innocence Protection Act of 2001*, 29 HOFSTRA L. REV. 1113 (2001).

²⁴⁶ See *Federal Government Proposes More than \$100 Million for DNA Analysis in Crime Investigations to Clear Five-Year Backlog*, NAT’L PUB. RADIO, Mar. 11, 2003. The bill provides \$755 million for backlogs and authorizes more than \$500 million for grant programs. See Juliet Eilperin, *Bipartisan Deal Reached on DNA Tests for Inmates*, WASH. POST, Oct. 2, 2003, at A02.

conduct has called into question Steven Crawford's 1974 murder conviction. During Crawford's 1974 murder trial, Roadcap's lab notes deviated dramatically from her testimony and the State's theory of the case.²⁴⁷ The notes, which were lost for roughly twenty-five years,²⁴⁸ contradicted three investigators' testimony about blood Roadcap said she discovered on handprints allegedly deposited by Crawford on a car at the murder scene.²⁴⁹ They also contradicted the crux of the prosecution's case, namely that because the blood fragments were only on the ridges of the prints and not in the valleys, blood must have been on Crawford's hand when he touched the car. The original notes retrieved from state police archives were crossed out to conform to Roadcap's testimony.²⁵⁰ In June 2002, Crawford won a third retrial because of this newly discovered evidence.²⁵¹ In July 2002, Dauphin County prosecutors finally ended Crawford's thirty-year tribulation when they decided not to pursue a third retrial.²⁵²

Suggested Reform: Establishment of independent crime laboratories. Forensic scientists need to be independent, free thinkers.²⁵³ Currently, however,

²⁴⁷ See Pete Shellem, *1970 Slaying; Prosecutors: Notes Don't Clear Man but DAs Admit Testimony Differed from Lab Reports in Crawford Case*, PATRIOT-NEWS (Harrisburg, Pa.), Feb. 20, 2002, at A01 ("Dauphin County prosecutors admitted in court papers . . . that lab notes from [Roadcap] contradict critical testimony that helped convict Steven Crawford of murder nearly 30 years ago.") [hereinafter Shellem, *1970 Slaying*]; Pete Shellem, *State Shuns Pair Sued by Crawford; Retired Trooper, Police Chemist Are Denied*, PATRIOT-NEWS (Harrisburg, Pa.), June 4, 2003, at A01. On September 12, 1970, John Eddie Mitchell was discovered murdered in Steven Crawford's family garage. A suspect never surfaced. Crawford was arrested and charged with the murder three and a half years later, largely on the basis of a handprint found at the scene. Editorial, *Justice Nearly; Crawford Has No Need for Monitor, Nor Should He Face Another Retrial*, PATRIOT-NEWS, June 26, 2002, at A12 [hereinafter *Justice Nearly*].

²⁴⁸ In May 2001 two youths came across a briefcase once owned by an investigator, containing documents from the Crawford case. Among them was a photocopied lab report written by Roadcap that contradicted critical testimony by her and other officers about the handprint. See *Justice Nearly*, *supra* note 247.

²⁴⁹ Roadcap and the investigators testified that minute specks of blood discovered on a palm print Crawford supposedly left on his father's car were only on the ridges of the print and not in the valleys between them. Roadcap's notes, however, claimed that several particles in the valleys of the print reacted positively to a presumptive blood test. That section of the notes was crossed out in a copy Roadcap submitted to state police archives. See Shellem, *1970 Slaying*, *supra* note 247.

²⁵⁰ See *id.*

²⁵¹ See *Justice Nearly*, *supra* note 247.

²⁵² See Pete Shellem, *30-Year Saga Ends; DA Drops Crawford Murder Charges*, PATRIOT-NEWS (Harrisburg, Pa.), July 17, 2002, at A01.

²⁵³ See, e.g., Joseph L. Peterson & John E. Murdock, *Forensic Science Ethics: Developing and Integrated System of Support and Enforcement*, 34 J. FORENSIC SCI. 749, 750 (1989) ("Scientists are to be objective and remain nonpartisan in their review of evidence."); R. Weinstock et al., *Ethics*, in 2 ENCYCLOPEDIA OF FORENSIC SCIENCE 706, 708 (Jay A. Siegel et al. eds., 2000) ("Forensic scientists . . . should possess an independence that protect[s] their objectivity.").

the “‘independence’ of forensic science is often largely mythical.”²⁵⁴ The incestuous relationship between law enforcement and crime labs must be severed.²⁵⁵ Independent crime labs would serve two goals. First, they would level the playing field with respect to defendants and the state when it comes to accessing forensic experts.²⁵⁶ Second, and more significantly, they would decrease the interaction between forensic practitioners, prosecutors, and investigators. This, in turn, would theoretically minimize prosecutorial bias and other forms of partiality that surface when these actors share working environments.²⁵⁷

Although the forensic scientists in the United Kingdom and Australia have embraced an independent configuration,²⁵⁸ the American forensic science community has perpetually rebuffed such an arrangement. Nonetheless, change may be forthcoming considering the increasing number of crime lab problems. For instance, Illinois Governor George Ryan’s Commission on Capital Punishment supported the independent crime lab concept.²⁵⁹ Likewise, Houston Police Chief C.O. Bradford and Harris County District Attorney Chuck Rosenthal acknowledged that the reoccurring crime lab mishaps “may warrant” creating an independent laboratory system.²⁶⁰

Problem #4: Scientifically ignorant forensic practitioners. Concepcion Bacasnot’s incompetent blood evidence testimony helped wrongly convict

²⁵⁴ Paul Wilson, *Lessons from the Antipodes: Successes and Failures of Forensic Science*, 67 FORENSIC SCI. INT’L 79, 82 (1994).

²⁵⁵ See Giannelli, *supra* note 106, at 471 (arguing for independent crime labs); James E. Starrs, *The Seamy Side of Forensic Science: The Mephitic Stain of Fred Salem Zain*, 17 SCI. SLEUTHING REV. 1, 8 (1993) (“The inbred bias of crime laboratories affiliated with law enforcement agencies must be breached.”). *But see* Craig Petterd & David Royds, “Independent” Forensic Practitioners—Fact or Fiction?, 31 AUST. J. FOR. SCI. 45 (1999) (noting opposition to independent crime labs); Marie Price, *Independent State Forensic Lab Concept Draws Mixed Views*, J. REC. (Okla. City), July 27, 2001.

²⁵⁶ See Paul C. Giannelli, *The Right to Defense Experts*, CRIM. JUST., Summer 2003, at 15 (“Forensic laboratory services . . . are not generally available to criminal defendants.”). Moreover, in some parts of the country judges in capital cases “routinely deny lawyers’ requests for expert . . . fees.” Marcia Coyle et al., *Fatal Defense: Trial and Error in the Nation’s Death Belt*, NAT’L L.J., June 11, 1990, at 30.

²⁵⁷ See Giannelli, *supra* note 106 (discussing pro-prosecution tendencies within the forensic science community). According to Professor Starrs, “Institutional bias in the forensic sciences is manifested by the policies, programs, or practices of an agency, an organization or a group, whether public or private, or any of its personnel which benefit or promote the interests of one side in a courtroom dispute, while either denying or minimizing the interests of the other side.” Starrs, *supra* note 129, at 134.

²⁵⁸ See Wilson, *supra* note 254 (discussing the independent model in New Zealand and Australia); *Crime Labs*, NAT’L PUB. RADIO, May 15, 2003 (discussing the United Kingdom’s system).

²⁵⁹ See REPORT OF THE GOVERNOR’S COMMISSION ON CAPITAL PUNISHMENT, *supra* note 33, at 52.

²⁶⁰ See Roma Khanna, *HPD Chief Proposes Independently Run Crime Lab*, HOUS. CHRON., Apr. 3, 2003, at 1.

Bernard Webster of rape.²⁶¹ Bacasnot “left the [Baltimore County crime lab] . . . four months after acknowledging she did not understand the science of her forensic tests and that her blood work in a death-penalty case was ‘worthless.’”²⁶² Similarly, when independent scientists from the University of North Texas Health Science Center reviewed Fort Worth crime lab analyst Karl Carmichael’s work product and proficiency testing results, they all “expressed ‘serious concerns’ about her training, forensic knowledge and laboratory practices.”²⁶³ Lastly, none of the analysts who worked in the Houston Police Department’s discredited DNA lab were qualified by education and training to perform the duties and responsibilities of their jobs.²⁶⁴

Suggested Reform: Teaching science and the scientific method. It is quite clear that present-day forensic practitioners are inadequately trained in science. The forensic science profession lacks minimum education standards for its personnel.²⁶⁵ The numerous laboratory letdowns and wrongful convictions have unmistakably demonstrated that the absence of an academic infrastructure has been a major contributing factor to the community’s incompetence.²⁶⁶ In short, “the failure of . . . forensic scientists . . . to understand how knowledge is acquired and applied leads to abuse.”²⁶⁷ Consequently, forensic science education must start emphasizing science and producing scientists. For more than a century, the forensic science community has steadfastly claimed that it is comprised of scientifically nimble professionals who are well versed in the methods of scientific investigation. Remarkably, though, several forensic practitioners have now come forward and conceded that,

What is usually not taught is the protocol of the scientific method, how to formulate a hypothesis, the prudent value in the formulation of a counter or null hypothesis, the way in which experimentation and comparative analysis are used to prove or disprove the state theory and the means by which

²⁶¹ See Stephanie Hanes, *Ex-Crime Lab Chemist’s Work Questioned*, BALT. SUN, Feb. 22, 2003, at 1B (discussing Webster’s wrongful conviction).

²⁶² Stephanie Hanes, *Chemist Quit Crime Lab Job after Hearing, Papers Show; She Acknowledged Report Was ‘Worthless’ in 1987*, BALT. SUN, Mar. 19, 2003, at 1B.

²⁶³ Deanna Boyd, *Scientist at Crime Lab is Fired*, FT. WORTH STAR-TELEGRAM, Apr. 22, 2003, at 1.

²⁶⁴ See Lise Olsen & Roma Khanna, *DNA Lab Analysts Unqualified; Review Finds Education, Training Lacking*, HOUS. CHRON., Sept. 7, 2003, at 01. Furthermore, when describing the competency level of the Houston crime lab personnel, Dr. Elizabeth Johnson, former head of the DNA lab at the Harris County Medical Examiner’s Office, concluded that, “I have never seen such a collective bunch of incompetents in my life They don’t understand how the testing should be done or how it should be interpreted. None of them can think it through any better than the others. They just don’t get it.” Lianne Hart, *DNA Lab’s Woes Cast Doubt on 68 Prison Terms*, L.A. TIMES, Mar. 31, 2003, at 19.

²⁶⁵ See, e.g., Joseph L. Peterson, *Ethical Issues in the Collection, Examination, and Use of Physical Evidence*, in FORENSIC SCIENCE 42 (Geoffrey Davies ed., 1986); David Stoney, *A Medical Model for Criminalistics Education*, 33 J. FORENSIC SCI. 1086, 1088 (1988).

²⁶⁶ See Michael J. Saks, *Prevalence and Impact of Ethical Problems in Forensic Science*, 34 J. FORENSIC SCI. 772, 789 (1989).

²⁶⁷ Thornton & Peterson, *supra* note 40, at 15.

evaluation and validation are applied to the results. In short, students are usually not properly taught about sameness and difference, at least not in a way that enables them to understand what each truly is, how each is caused and to what extent each may be recognized.²⁶⁸

Prominent toolmark examiners, crime scene reconstructionists, fire investigators, and forensic dentists have finally acknowledged that their respective professions have not been trained in or employing the scientific method for the past century.²⁶⁹

Traditional science and forensic science education differ considerably from one another. Conventional scientists normally possess doctoral degrees in one of the natural or physical sciences. On the other hand, individuals who are deemed forensic scientists typically have only a Bachelor's degree in either chemistry or biology.²⁷⁰ Considering the recurring problems of competency, the forensic science community should strongly consider endorsing a Ph.D.-oriented educational path for all aspiring forensic scientists.²⁷¹ Such an avenue would not only provide a strong theoretical foundation in science but it would also permit would-be forensic scientists to develop essential laboratory skills.²⁷² Although Ph.D.-level programs are noticeably absent, graduate education in

²⁶⁸ David L. Grieve, *The Identification Process: SWGFAST and the Search for Science*, 50 J. FORENSIC IDENTIFICATION 145, 148 (2000). The Honorable Fred Kaufman, who presided over Guy Paul Morin's wrongful conviction inquiry, reinforced this claim when he recommended that, "Forensic scientists at the [Centre for Forensic Sciences] should be instructed to adopt [the scientific method] approach, particularly in connection with a hypothesis that a suspect or accused is forensically linked to the crime." KAUFMAN, *supra* note 160, at 346.

²⁶⁹ See Tom Bevel, *Applying the Scientific Method to Crime Scene Reconstruction*, 51 J. FORENSIC IDENTIFICATION 150, 150 (2001) ("The purpose of this paper is to promote the use of scientific method as the best model for crime reconstruction and thus become the standard methodology."); Richard A. Grybowski & John E. Murdock, *Firearm and Toolmark Identification—Meeting the Daubert Challenge*, 30 AFTE J. 3 (1998) ("We are confident that if examiners become knowledgeable about and conversant with the scientific method . . . their expert testimony will be easier to understand and will be met with far less challenge or opposition."); John J. Lentini, *The Scientific Basis of Expert Testimony on Fires, Arsons, and Explosion*, in SCIENCE IN THE LAW: FORENSIC SCIENCE ISSUES 356 (David L. Faigman et al., eds., 2002) ("[T]he vast majority of practitioners of this 'scientific' endeavor are not scientists and have little, if any, scientific training or education."); Raymond D. Rawson, *Identification from Bite Marks*, in 2 MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY 156, 175 (David L. Faigman et al. eds., 1997) ("Disagreements also may reflect the lack of training in rigorous scientific method on the part of dental school.").

²⁷⁰ See Kenneth G. Furton et al., *What Educational Background Do Crime Laboratory Directors Require from Applicants*, 44 J. FORENSIC SCI. 128 (1999).

²⁷¹ Currently, no Ph.D. program in criminalistics or forensic science exists in the United States. This trend is not simply an American phenomenon because only two such programs exist worldwide. See INMAN & RUDIN, *supra* note 54, at 303.

²⁷² As Professor Randolph N. Jonakait argued a more than a decade ago, "Most forensic scientists have not been placed into a crucible that is likely to forge that kind of analytical thinking. They are unlikely to have had the opportunity to learn how to design experiments which answer rigorous questions." Randolph N. Jonakait, *Forensic Science: The Need for Regulation*, 4 HARV. J.L. & TECH. 109, 136 (1991).

forensic science is still possible considering that a number of American universities offer graduate level programs. Unfortunately, very few of these programs provide for or require intensive, hands-on training in scientific research that would allow for the development of the requisite analytical skills to tackle the countless scenarios confronted by crime laboratory personnel.²⁷³

The *CSI* phenomenon has only exacerbated the educational problem. Thousands of colleges and universities around the country have established forensic science courses and programs in response to forensic science's increased notoriety thanks in part to shows such as *CSI*, *Crossing Jordan*, and *Forensic Files*.²⁷⁴ According to scientists and forensic experts, however, many of these programs are of poor quality.²⁷⁵ These programs usually offer nothing more than an overview or introduction to forensic science. A demanding physical science curriculum and laboratory work are seldom incorporated into these programs.²⁷⁶

Developing quality Ph.D.-oriented curriculums and training programs requires appropriate funding. While it appears forensic educational programs are receiving more funding, the forensic science community must be cautious not to overlook quality for quantity. All educational funding must be effectively utilized to enhance and deepen the community's understanding of science and the scientific method. Merely creating many forensic science programs that offer watered down versions of science does not ensure that such an objective will be attained. In the end, the forensic science community's educational agenda must emphasize that forensic scientists are in the business of science and not criminal investigations. Contrary to popular television and many forensic science programs, a forensic scientist is not a detective.²⁷⁷ The confirmatory thought process that drives the investigator in proving the

²⁷³ See INMAN & RUDIN, *supra* note 54, at 303 (“[I]t is possible to earn a degree called ‘Masters in Forensic Science’ without ever having set foot in a laboratory or even having taken a core curriculum of hard science classes.”).

²⁷⁴ See Jonathan D. Rockoff, *Forensic Science Is Hot New Thing*, BALTIMORE SUN, Feb. 28, 2003, at 1A.

²⁷⁵ As one forensic science scholar noted, “There’s been a lot of so-called fly-by-night programs that are pretty poor.” So deficient are these programs that “[p]eople don’t even hire their graduates because they’re so poor.” *Crime Labs*, *supra* note 258 (quoting Professor Joe Mascarenhas of the State University of New York at Albany).

²⁷⁶ See Brian A. McGaw & Jon Hanna, *Stiff Standards*, TIMES HIGHER EDUCATION SUPPLEMENT, May 9, 2003, at 15 (“Many courses with forensic in the title may indeed have insufficient science content.”).

²⁷⁷ Consider the following quote by a forensic scientist advocating the teaching of forensic science in high school: “Forensic science appeals to the *detective* in all of us as evidenced by the growth in popularity of media including TV, best-selling novels, and movies that portray some aspect of crime solving.” Editorial, *Forensics: The Thrill Is The Detective Work*, WALL ST. J., Mar. 5, 2002, at A17 (emphasis added). I would argue that for aspiring *scientists* forensic science would appeal to the *scientist* in all of us. It is comments like this that create the inaccurate notion that forensic scientists are supposed to solve crimes by acting like investigators rather than acting like objective and neutral fact-finders with the intent of providing scientific answers to legally posed questions.

defendant's guilt is inconsistent with the disconfirmatory mindset of anyone who calls himself or herself a scientist.

Problem #5: Statistically incompetent forensic practitioners. Arnold Melnikoff's statistical incompetence played an instrumental role in Jimmy Ray Bromgard,²⁷⁸ Chester Bauer,²⁷⁹ and Paul Kordonowy's²⁸⁰ wrongful convictions. According to Walter Rowe, a forensic chemistry professor at George Washington University,

Everything about the estimates in Melnikoff's [statistical] testimony is just bullshit It is nonsense on stilts. The most glaring is this idea that microscopic features of head hair and pubic hair are not correlated, that those are independent probabilities This kind of theorizing flies in the face of every adult's common knowledge. Anyone can look at that and rightly ask what in the world he was talking about.²⁸¹

Jamien Demon Nickerson's death penalty case is another illustration of statistical incompetence by a forensic practitioner. Prior to Nickerson's trial, Fort Worth prosecutors received a DNA report from Karla Carmichael.²⁸² As the trial neared, Carmichael submitted another unsolicited and amended DNA report that strengthened the prosecution's case.²⁸³ Curious and skeptical of the unsolicited report, prosecutors requested that the Medical Examiner's (ME's) office retest the DNA. The ME's results were disturbing because they differed significantly from Carmichael's findings.²⁸⁴ Citing the ME's results, prosecutors abruptly abandoned their plans to seek the death penalty against Nickerson.²⁸⁵

During Sally Clark's child-killing murder trial in England, Professor Sir Roy Meadow testified that the probability of two children dying from a cot

²⁷⁸ See *Wrong Conviction Brings Scientist's Work into Question*, SAN DIEGO UNION-TRIB., Jan. 5, 2003, at A4 (discussing Bromgard's wrongful conviction).

²⁷⁹ See Lise Olsen, *Crime Lab Worker Failed to Qualify to Test Hair Samples*, SEATTLE POST-INTELLIGENCER, Jan. 2, 2003, at A1 (discussing Bauer's erroneous conviction).

²⁸⁰ See Bohrer, *supra* note 87 (discussing Kordonowy's erroneous conviction).

²⁸¹ Charlie Gillis, *Scandal in the Forensic Labs: Hundreds of Cases Undergoing Review in Montana*, NAT'L POST, Feb. 1, 2003, at B01.

²⁸² See Melody McDonald, *DNA Test Sways Prosecutor*, STAR-TELEGRAM (Ft. Worth, TX), Oct. 10, 2002, at 1.

²⁸³ *Id.* According to lead prosecutor Mike Parrish, "[The report] comes in, and it's better for me But I was kind of like Something is not right here, let me check this out."

²⁸⁴ According to Parrish, the differences were "like A to Z, night and day." *Id.* Sources knowledgeable with the case stated that Carmichael's report concluded that a DNA profile lifted from Nickerson's clothing matched Lerma's DNA. Moreover, Carmichael's report concluded that such a profile occurs in only one out of every twenty-nine million Southwest Hispanics. Conversely, the ME's office concluded that thirty out of every hundred white, black, or Hispanic people could have been the source of the DNA sample. *Id.*

²⁸⁵ As Parrish explained, "When I lost my conclusive DNA . . . the prudent thing to do was waive the death penalty." *Id.*

death in a family was 1 in 73 million.²⁸⁶ Not surprisingly, when Clark was exonerated, the Royal Statistical Society described Professor Meadow's testimony as an example of a medical expert witness "making a serious statistical error."²⁸⁷ Similarly, Professor Meadow's statistical inaccuracies also played a significant role in Angela Cannings' recent wrongful conviction.²⁸⁸

Lastly, when Josiah Sutton was wrongly convicted of rape in 1998, a Houston crime lab analyst testified that Sutton's DNA profile "can be expected to occur in 1 out of 694,000 people among the black population" in the United States.²⁸⁹ Needless to say, the analyst was not even close seeing as independent forensic scientists demonstrated that the DNA in Sutton's case matched 1 out of 8 black people, not 1 out of approximately 700,000.²⁹⁰ Not unexpectedly, the analyst may have been a little overwhelmed with the statistical complexities associated with DNA analyses, as her statistical training consisted only of a two-week training course sponsored by the company that sold the DNA kit to the laboratory.²⁹¹

Suggested Reform: Teaching statistics and mandating statistical competence. Forensic science has chosen a task unknown to other sectors of science—individualizing physical entities.²⁹² Contrary to what many forensic scientists claim, individuality determinations are not based on one's common sense or experience. Rather, behind every conclusion rendered by a forensic scientist there is a statistical basis.²⁹³ The statistical basis "provides . . . an evaluation of the likelihood that his testimony reflects the truth, rather than his personal belief or bias."²⁹⁴ Consequently, besides understanding science and the scientific method, forensic scientists must be competent consumers of statistics.²⁹⁵ Unfortunately, aspiring forensic scientists are rarely forced to take one statistics course, let alone an entire series of classes, during their undergraduate or graduate education. As a result, practicing forensic scientists

²⁸⁶ See Roger Ede, *Wrongful Convictions Put Forensic Science in the Dock*, THE TIMES (London), Feb. 3, 2004, at 3.

²⁸⁷ *Id.*

²⁸⁸ See, e.g., Lizette Alvarez, *A Mother's Ordeal Forces Britain to Review Crib Deaths*, N.Y. TIMES, Feb. 8, 2004, at 3; *No Defense; Justice Demands the Highest Standards from Forensic Science*, NEW SCIENTIST, Jan. 31, 2004, at 3.

²⁸⁹ Liptak, *supra* note 5.

²⁹⁰ *See id.*

²⁹¹ *See id.*

²⁹² See James W. Osterburg, *The Evaluation of Physical Evidence in Criminalistics: Subjective or Objective Process?*, 60 J. CRIM. L. & CRIMINOLOGY 97, 97 (1969) ("Criminalistics is the science of individualization.").

²⁹³ See Thornton & Peterson, *supra* note 40, at 24.

²⁹⁴ Paul L. Kirk & Charles R. Kingston, *Evidence Evaluation and Problems in General Criminalistics*, 9 J. FORENSIC SCI. 434, 437 (1964).

²⁹⁵ See INMAN & RUDIN, *supra* note 54, at 302 ("Now, more than ever, the onslaught of technology obligates the criminalist to draw on a strong background in the physical sciences, including an understanding of statistics and logic." (emphasis added)).

are poor consumers of statistics.²⁹⁶ In addition to the instances discussed above, many other examples clearly illustrate this unfortunate reality.²⁹⁷ In short, the forensic science community's educational agenda must incorporate a provision mandating that forensic scientists be proficient consumers of statistics.

Problem #6: Unsubstantiated or questionable techniques masquerading as science. The FBI's comparative bullet-lead analysis (CBLA) technique is currently under attack.²⁹⁸ CBLA's primary assumption is that each batch of lead that produces bullets is unique and that no two batches will ever have similar or identical chemical signatures.²⁹⁹ The technique, which has been employed for more than thirty years, has proved invaluable in those cases where little or no direct evidence links the suspect to the crime.³⁰⁰ The technique also offers a convenient way to link a suspect to a crime even if authorities fail to locate a firearm. Remarkably, CBLA's fundamental metallurgical premises have rarely, if ever, been substantiated by any significant research. Accordingly, when research was recently initiated the

²⁹⁶ See Kirk & Kingston, *supra* note 294, at 435 (noting that "criminalists . . . do not understand statistics, and do not know how to use them constructively"). According to Professor Moenssens,

Experts use statistics compiled by other experts without any appreciation of whether the data base upon which the statistics were formulated fits their own local experience, or how the statistics were compiled. Sometimes these experts, trained in one forensic discipline, have little or no knowledge of the study of probabilities, and never even had a college level course in statistics.

Moenssens, *supra* note 56, at 18. Forensic examiners have testified in numerous cases to specific probabilities based on statistical studies of unexplained origin. See Smith & Goodman, *supra* note 76, at 257-58. Such conduct is inexcusable because "[w]ithout a firm grasp of the principles involved, the unwary witness can be lead into making statements that he cannot properly uphold, especially in the matter of claiming inordinately high probability figures." Kirk & Kingston, *supra* note 294, at 437.

²⁹⁷ See, e.g., Roma Khanna, *New DNA Tests Weaken 4 Cases; HPD Shown to Be 'Just Way Off' in One Case; 5 Others Validated*, HOUS. CHRON., Aug. 2, 2003, at 1 (noting that Houston crime lab analysts "drastically miscalculated matches, overestimating their strength to the point that one prosecutor worries a defendant was incorrectly influenced to plead guilty to a sexual assault"); Carlos Miller, *Phoenix Police Lab Errs on DNA*, AZ. REP., May 6, 2003, at 1B (discussing how Phoenix crime lab technicians miscalculated the likelihood that a person's DNA was present on evidence in nine cases).

²⁹⁸ See Tobin & Duerfeldt, *supra* note 218 (questioning the validity of CBLA); Charles Piller & Robin Mejia, *Science Casts Doubt on FBI's Bullet Evidence Method*, L.A. TIMES, Feb. 3, 2003, at A1 (same).

²⁹⁹ See Tobin & Duerfeldt, *supra* note 218. Certain FBI examiners have testified that they were able to associate a bullet or fragment with a *specific box of bullets*. For instance, during a 1988 Texas murder trial, FBI examiner John P. Riley testified that, "From my 21 years of experience doing bullet-lead analysis, I can determine if bullets came from the same box of ammunition . . . That is the case that we have here." Piller & Mejia, *supra* note 298.

³⁰⁰ See Charles A. Peters, *The Basis for Compositional Bullet Lead Comparisons*, 4 FORENSIC SCI. COMM. (2002), available at <http://www.fbi.gov/hq/lab/fsc/backissu/july2002/peters.htm> (noting that "[c]omparative bullet lead analysis was developed in the early 1960s by researchers at General Atomic . . . under a federal grant to develop uses for neutron activation analysis").

results raised many disturbing questions, the most significant being why it took thirty years to rigorously test CBLA's premises.

Researchers concluded that CBLA's premises were flawed and incompatible with elementary metallurgical principles,³⁰¹ calling into question numerous convictions and some executions.³⁰² The research has also intensified the debate concerning CBLA's validity and probative value.³⁰³ Only now, after thirty years of professing the validity of CBLA, has the FBI asked an independent agency to evaluate its legitimacy. Upon review, the eleven-member committee from the National Research Council found that CBLA was scientifically flawed and potentially misleading to juries.³⁰⁴ From all indications, CBLA represents yet another instance where untested convictions regarding a forensic identification technique masqueraded as science in the courtroom.³⁰⁵

Suggested Reform: Conducting proactive research. Numerous forensic science sectors have conducted little, if any, systematic research geared toward validating the basic premises that constitute their continued existence.³⁰⁶ Various forensic examiners have even acknowledged that their respective fields of forensic science are scarcely supported by any legitimate scientific research.³⁰⁷ For instance, because of insufficient empirical data the concept of

³⁰¹ See Tobin & Duerfeldt, *supra* note 218.

³⁰² See Piller & Mejia, *supra* note 298 (discussing these cases).

³⁰³ See Charles Piller, *FBI Defends Bullet Matching; An Expert Panel Begins a Review of the Forensic Method Criticized by Some as Flawed*, L.A. TIMES, Feb. 4, 2003, at A10 (discussing the ongoing debate).

³⁰⁴ See NATIONAL RESEARCH COUNCIL, FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE (2004), available at <http://www.nap.edu/catalog/10924.html>; Charles Piller, *FBI's Crime Scene Bullet Analysis Test Flawed*, L.A. TIMES, Nov. 21, 2003, at 28.

³⁰⁵ See, e.g., Douglas A. Dribben, *DNA Statistical Evidence and the "Ceiling Principle": Science or Science Fiction*, 146 MIL. L. REV. 94, 110 (1994) ("History is replete with discoveries of 'scientific principles' that are at first widely accepted, yet later proven false."). The paraffin method of testing for the recent discharge of a firearm is perhaps the most memorable. See I.C. Stone, *Evidence of Firearms Discharge Residues*, 33 BAYLOR L. REV. 285, 286 (1981) (discussing how belated research ultimately disproved the notion that the presence of nitrates or nitrites on a suspect's hand conclusively established that they recently discharged a firearm). Other forensic fads hurried into the criminal justice system under the guise of science included the Nalline test and voiceprint identification. See COMMITTEE ON EVALUATION OF SOUND SPECTROGRAMS, NATIONAL ACADEMY OF SCIENCES, ON THE THEORY AND PRACTICE OF VOICE IDENTIFICATION (1979) (debunking voice printing's fundamental premises); *People v. Sarkissian*, 146 Cal. Rptr. 508, 511 n.2 (Cal. Ct. App. 1978) (noting that the "Nalline test has fallen into desuetude").

³⁰⁶ By no means is this a recent realization. Forensic practitioners have commented on the community's lack of research for nearly half a century. See James Osterburg, *A Commentary on Issues of Importance in the Study of Investigation and Criminalistics*, 11 J. FORENSIC SCI. 261, 261 (1966).

³⁰⁷ For lack of data concerning toolmark and firearm examination, see Jerry Miller & Michael McLean, *Criteria For Identification of Toolmarks*, 30 AFTE J. 15, 18 (1998). For lack of data in regards to handwriting identification, see D. Michael Risinger et al., *Brave New Post-Daubert World—A Reply to Professor Moenssens*, 29 SETON HALL L. REV. 405

individuality, which is the fundamental notion underlying forensic science's continued existence, has yet to be legitimized, as science acknowledges "no meaning that is not empirically definable and accepts no significance that is not empirically demonstrable."³⁰⁸

Furthermore, the research that is conducted can often be described as reactive, as it is typically initiated to quell criticism over a technique's accuracy.³⁰⁹ The CBLA research is a perfect illustration of this knee-jerk type behavior. Put simply, forensic science research endeavors are characteristically not creative manifestations of imaginative and intellectually driven forensic scientists. Instead, forensic science research routinely surfaces only after a judicial entity has knocked on the community's front door with hopes of reminding it that scientists conduct science and not criminal investigations.

Because there is an imperceptible amount of forensic research, forensic practitioners, unlike traditional scientists, are unrestrained by data-based knowledge of their field or the phenomena that their field purports to study. These conditions permit forensic practitioners to make exaggerated claims about the character and significance of those phenomena and about what forensic practitioners can deliver.³¹⁰ Equally significant is that this nonconstraining, amorphously defined base of knowledge permits forensic practitioners to rely almost entirely on their so-called experience or intuition, as opposed to empirical data, when rendering conclusions and opinions.³¹¹ In short, many courtroom statements and conclusions by forensic examiners are

(1998). For lack of data in forensic odontology, see Bowers, *supra* note 66, at 246; Raymond D. Rawson, *Reliability of the Scoring System of the American Board of Forensic Odontology for Human Bite Marks*, 31 J. FORENSIC SCI. 1235 (1986). For lack of data and empirical research regarding fingerprinting, see Stoney, *supra* note 218, at 99. For lack of data and empirical research in hair and fiber analysis, see C. Roux & Bernard Robertson, *Fibers: Significance*, in 2 ENCYCLOPEDIA OF FORENSIC SCIENCE 829, 830-31 (Jay A. Siegel et al. eds., 2000). For lack of research concerning crime scene reconstruction, see INMAN & RUDIN, *supra* note 54, at 177. For lack of data with respect to bloodstain pattern analysis, see Edward J. Imwinkelried, *Forensic Science: Bloodspatter Analysis*, 36 CRIM. L. BULL. 509, 516 (2000).

³⁰⁸ Lee Loevinger, *Jurimetrics: Science in Law*, in SCIENTISTS IN THE LEGAL SYSTEM 7, 11 (William Thomas ed., 1974).

³⁰⁹ When research has been conducted to assess the untested convictions of forensic examiners, this research has generally debunked these untried beliefs. For instance, arson investigators long relied on anecdotal theories about fire dynamics and the meaning of particular shaped burn patterns to conclude whether a fire was intentionally set. These theories were never tested until the late 1990s. When the U.S. Fire Administration released the results of these tests, "[s]everal of the 'old fire investigator's tales' and fire investigation misconceptions . . . were . . . shown to be unsubstantiated by the . . . testing." Lentini, *supra* note 269, at 359.

³¹⁰ As Richard Saferstein, former chief forensic scientist for the New Jersey State Police, expressed in a recent interview, "[T]he problem with bullet-lead analysis is not with the lab work but with the conclusions drawn from it. The FBI . . . has tended to *overstate the significance* of such evidence." Piller & Mejia, *supra* note 298 (emphasis added).

³¹¹ See *supra* notes 129-31 and accompanying text (discussing how forensic experts utilize the experience shield).

not reflections of legitimate science. Rather, they merely reflect the hopes and dreams of the field's founders. As Judge Easterbrook insightfully notes, however, "Intuition is a poor substitute for data. Before sending a man to his death a state should have more regard for both law and fact."³¹²

Research is also critical because it can expose fertile avenues of study that can improve existing forensic technologies.³¹³ Unfortunately, because so little research has been carried out over the past century, no organized body of knowledge flourished within the forensic science community. With no structured institution of data to work with, generations of forensic practitioners have been unable to build upon the initial foundations enunciated by the community's founding fathers. Accordingly, there is little difference between the techniques of present-day forensic examiners and those used at the turn of the century.³¹⁴

The forensic science community must mandate a proactive research agenda aimed at developing and enhancing forensic science technology and identifying the limitations and authenticity of individuality. If the new educational reforms are enacted such that forensic practitioners are trained and educated to be proactive, independent, and free-thinking scientists, forensic examiners and scientists will not wait for a court order to initiate this research, and will instead initiate it on their own. In the end, as Professor Michael J. Saks rightfully questions, "Why wait for courts to declare the scientific foundation to be inadequate, and then begin rebuilding—or building?"³¹⁵

IV. CONCLUSION

While I do not condone or advocate capital punishment, I am a realist and understand that capital punishment will be employed for many more years to come simply because of its political appeal.³¹⁶ Consequently, because eradicating capital punishment is not a pragmatic option, especially in a post-

³¹² *Brewer v. Aiken*, 935 F.2d 850, 862 (7th Cir. 1991) (Easterbrook, J. concurring) (discussing the empirical data concerning capital juries).

³¹³ See Lawrence Koblinsky & Francis X. Sheehan, *The Desirability of a Ph.D. Program in Forensic Science*, 29 J. FORENSIC SCI. 706, 707 (1984) (stressing the unrecognized need for forensically oriented basic research).

³¹⁴ See Samuel E. Gross, *Detection of Deception: The Case of Handwriting Expertise*, 87 VA. L. REV. 1847, 1848 (2001) ("The basic method of handwriting identification is the same now as it was in Twelfth Night.").

³¹⁵ Michael J. Saks, *Ethics in Forensic Science: Professional Standards for the Practice of Criminalistics*, 43 JURIMETRICS J. 359, 364 (2003) (book review).

³¹⁶ See, e.g., Stephen B. Bright, *The Politics of Capital Punishment: The Sacrifice of Fairness for Executions*, in AMERICA'S EXPERIMENT WITH CAPITAL PUNISHMENT 117-138 (James R. Acker et al. eds. 1998) (commenting on capital punishment's inherently political nature); Austin Sarat, *Capital Punishment as a Legal, Political, and Cultural Fact: An Introduction*, in THE KILLING STATE: CAPITAL PUNISHMENT IN LAW, POLITICS, AND CULTURE 3, 4 (Austin Sarat ed. 1999) ("it . . . appears that the killing state will be a regular part of the landscape of American politics for a long time to come").

9/11 world,³¹⁷ the only viable alternative is *reform*. Capital punishment reform, at least from the guilt-innocence perspective (rather than the penalty-phase perspective), should focus on one question and one question only—are we correctly identifying the *actual* perpetrator in *every* capital case? Any techniques or procedures, whether legal or non-legal, that can enhance the capital punishment system’s accuracy need to be seriously contemplated, if not absolutely implemented.

Forensic *science* technology has the *potential* to accomplish this objective.³¹⁸ The capital punishment system categorically cannot survive without the fabled forensic scientist. Nonetheless, to reap the true benefits of this treasured tool, we must be assured that what is being offered to the courts is accurate and reliable science and not simply ignorance or good faith beliefs masquerading as science. Ignorance and blind faith have factored into an unacceptable number of wrongful capital and noncapital convictions and missed opportunities of justice. To make certain that legitimate science is the artifact of all forensic examinations, we must ensure that our crime laboratories are institutions of science that employ methodically driven, analytically agile forensic scientists.

Forensic science reform must start and end with two essential ingredients—science and funding. Emphasizing science requires the forensic science community to implement reforms completely altering its tradition-based landscape. If the objective of forensic science reform is to ensure that forensic scientists are employing scientific methods to help determine a contextual truth, the organizational infrastructures of forensic laboratories need to be reconfigured and their cultural necessities reoriented. Moreover, accentuating science in forensic science is not a legitimate ambition unless an economic revolution parades across the community’s impoverished landscape. Like a seed that craves water so the world may witness firsthand its true splendor as a flower, the forensic science community desperately yearns for and is in dire need of suitable funding so it may flex its true muscles and demonstrate to the criminal justice system that science can rectify many of the human frailties that plague our criminal justice system.

More importantly, executions should be immediately halted until our nation’s crime laboratories and forensic scientists have thoroughly demonstrated their accuracy and proficiency. Forensic pathologist Dr. Cyril H. Wecht has advocated such an approach. According to Dr. Wecht, state

³¹⁷ Some have argued, however, that “the events of Sept. 11 actually strengthen[ed] familiar arguments *against* the death penalty and provide[d] powerful new arguments against it as well.” Stephen Nathanson, *As You Were Saying . . . Death Penalty Still Bad Idea in the Post-Sept. 11 World*, BOSTON HERALD, Feb. 10, 2002, at A22.

³¹⁸ See Rick Klein & Frank Phillips, *Science Key in Building Case for Death Law*, BOSTON GLOBE, Sept. 30, 2003, at B1 (discussing the Massachusetts Governor’s plan to reinstitute the death penalty in Massachusetts under a statute that allegedly will guard against wrongful executions by putting “science ahead of all other considerations”).

lawmakers should carefully scrutinize DNA labs that use inferior testing methods leading to inaccurate results. An immediate freeze on executions is essential until scrupulous federal and state reviews of all DNA labs have been accomplished. This is the only just way to proceed: “Close attention to this critical problem will not only lower the risk of executing innocent people, it will also facilitate the capture and conviction of the guilty.”³¹⁹

My true sentiments mirror those of Professor Edward J. Imwinkelried’s:

It is not the use of expert testimony that I oppose but rather the abuse of expert testimony. The abuse consists in introducing overstated opinions by unqualified witnesses, based on unproven theories or insufficient facts. That sort of expert testimony creates the same potential for miscarriage of justice as the rankest lay testimony.³²⁰

If the abuse and poor quality of forensic science does not stop and the community’s current mindset, structural configuration, and poor funding are not altered, more innocent individuals will be unjustly incarcerated, and worse yet, some may even be mistakenly executed. In the end, as Professor Randolph N. Jonakait urged more than a decade ago in his groundbreaking article, “It is time to stop the miscarriages of justice” that can result from poor forensic science.³²¹

³¹⁹ Wecht, *supra* note 49.

³²⁰ IMWINKELRIED, *supra* note 48, at 418.

³²¹ Jonakait, *supra* note 272, at 109.

APPENDIX A. WRONGFUL CAPITAL CONVICTIONS

A. Hair Identification

Ronald Williamson (1988): Williamson and his codefendant Dennis Fritz were convicted in 1988 for Debbie Carter's 1982 murder in Ada, Oklahoma. Williamson was sentenced to death.³²² As federal district judge Frank H. Seay noted, "The prosecution's only physical evidence, apart from the semen evidence, were hairs allegedly found to be 'microscopically consistent' with [Williamson] and his co-defendant Dennis Fritz."³²³ Melvin Hett, a forensic chemist with the Oklahoma State Bureau of Investigation, testified that two hairs found on a washcloth were microscopically consistent with Williamson's scalp hairs and that two hairs found on Carter's bedding were microscopically consistent with Williamson's pubic hairs.³²⁴ Moreover, Hett testified that Glen Gore's hair samples were "not 'microscopically consistent'" with the questioned hairs.³²⁵ Curiously, Hett's conclusions were contradicted by the blood evidence.³²⁶

Williamson and Fritz were exonerated in April 1999 when DNA testing established their innocence.³²⁷ Remarkably, the DNA evidence used to clear Williamson and Fritz inculpated Glen Gore, the state's star witness during their preliminary hearings.³²⁸ Gore is currently being prosecuted for the murder.³²⁹

Charles Fain (1984): Fain was convicted in 1983 for the 1982 murder of nine-year-old Daralyn Johnson. He was sentenced to death in 1984.³³⁰ Fain passed a polygraph examination and several witnesses claimed he was in Redmond, Oregon at the time of the murder. Two jailhouse informants, nonetheless, testified that Fain made incriminating remarks. Local police also said that Fain had lied about his whereabouts and that shoeprints found near the crime scene could have been made by his shoes. However, the most critical evidence against Fain was provided by an FBI technician who testified that pubic hairs found on the victim's clothing were microscopically similar to

³²² *Williamson v. State*, 812 P.2d 384 (Okla. Crim. App. 1991).

³²³ *Williamson v. Reynolds*, 904 F. Supp. 1529, 1552 (E.D. Okla. 1995).

³²⁴ *Williamson*, 812 P.2d at 391.

³²⁵ *Williamson*, 904 F. Supp. at 1554.

³²⁶ *Williamson*, 812 P.2d at 391.

³²⁷ *See 2 Men Go Free—Thanks to DNA Evidence*, ORLANDO SENTINEL, Apr. 16, 1999, at A16.

³²⁸ *See* Bob Doucette, *Woman's Killer Gets Death Penalty*, DAILY OKLAHOMAN, May 23, 2003, at 9A.

³²⁹ Bob Doucette, *Jury Selection Begins in Trial for '82 Slaying*, DAILY OKLAHOMAN, May 13, 2003, at 3A.

³³⁰ *State v. Fain*, 774 P.2d 252 (Idaho 1989).

Fain's.³³¹ In June 2002, DNA conclusively established that the hairs did not originate from Fain.³³²

Rudolph Holton (1986): Holton was convicted and sentenced to death for Katrina Graddy's rape-murder in 1986.³³³ A key piece of evidence used against Holton was a hair found in Graddy's mouth. According to a forensic expert, the hair "had to" have been Holton's.³³⁴ When DNA testing became easily accessible, prosecutors acrimoniously fought not to use it in Holton's case, calling his request "a delaying tactic."³³⁵ When the hairs were tested they turned out to be Graddy's. In November 2001, the trial court granted Holton's new trial motion because prosecutors failed to turn over exculpatory evidence. In December 2002, the Florida Supreme Court affirmed the trial court's new trial order.³³⁶ In January 2003, all charges were dropped against Holton.³³⁷

Robert Miller (1988): Miller was convicted and sentenced to death in 1988 for the 1987 rape-murders of two elderly women.³³⁸ Oklahoma City forensic scientist Joyce Gilchrist linked Miller to the crime by hair identification.³³⁹ Miller was granted a new trial in 1995 after DNA tests excluded Miller as the semen donor and inculpated another suspect, Ronald Lott. Gilchrist's initial examinations excluded Lott as a possible hair donor. Miller was freed from death row in 1998.³⁴⁰

³³¹ See *id.* at 255; see also Henry Weinstein, *Condemned Man Could Go Free After DNA Testing Justice: On Death Row*, L.A. TIMES, Aug. 19, 2001, at A1.

³³² See Weinstein, *supra* note 331.

³³³ *Holton v. State*, 573 So. 2d 284 (Fla. 1990).

³³⁴ Howard Troxler, *Holton Case Shows It's Time to Bring the Death Penalty to Justice*, ST. PETERSBURG TIMES, Feb. 12, 2003, at 1B.

³³⁵ See *id.*

³³⁶ *State v. Holton*, 835 So. 2d 269 (Fla. 2002).

³³⁷ According to prosecutors, "Due to the unreliability of witness testimony and the lack of physical evidence, the state of Florida cannot proceed to trial." CNN.com, *Charges Dropped Against Florida Inmate After 16 Years on Death Row*, Jan. 24, 2003, at <http://www.cnn.com/2003/LAW/01/24/death.row.release/index.html>.

³³⁸ See Jim Yardley, *Inquiry Focuses on Scientist Employed by Prosecutors*, N.Y. TIMES, May 2, 2001, at A14.

³³⁹ See *id.*; see also Diana Baldwin & Ed Godfrey, *Hair Analysis Under Scrutiny*, DAILY OKLAHOMAN, June 3, 2001.

³⁴⁰ See Ed Godfrey, *DNA Test Links Inmate to Murders; Judge Orders Trial*, DAILY OKLAHOMAN, Mar. 21, 1998, at 8; Bill Hewitt et al., *Shadow of Doubt; An Expert's Testimony Convicted an Innocent Man. Was He the Only Victim?*, PEOPLE, May 28, 2001 at 58.

B. Bite Mark Identification

Ray Krone (1992): Krone was convicted twice for Kim Ancona's 1991 murder. Krone was initially sentenced to death in 1992.³⁴¹ That sentence was overturned in 1995, but he was convicted again in 1996 and sentenced to life. As the Arizona Supreme Court commented, Ancona's "killer left very little behind . . . no fingerprints . . . no semen . . . the blood at the scene matched Ancona's . . . [and supposedly] no DNA."³⁴² The offender left behind one critical piece of evidence, however: bite marks on Ancona's neck and left breast. Ray Lawson, a well-respected forensic dentist, testified that Krone's bite pattern matched those found on Ancona. The bite marks were critical "because there was very little other evidence to suggest Krone's guilt."³⁴³ In 2002, Krone's postconviction attorneys requested DNA testing on the saliva found on Ancona's tank top. The test results excluded Krone but inculpated Kenneth Phillips who was already in prison for attempted child molestation.³⁴⁴ When Krone was released in April 2002, Maricopa County prosecutors indicated that they strongly believed the wrong man was convicted.³⁴⁵

Greg Wilhoit (1987): Wilhoit was convicted and sentenced to death in 1987 for the 1985 murder of his estranged wife, Kathy Wilhoit. The only physical evidence linking Wilhoit to the murder was a bite mark on Kathy's breast. Two forensic dentists testified that bite marks are as exact as fingerprints and that the mark on Kathy matched Wilhoit's teeth perfectly. In 1993, Wilhoit was granted a new trial because his trial attorney had rendered ineffective assistance. During his second trial, eleven forensic dentists testified that Wilhoit could not have caused the bite mark on Kathy. In the middle of his new trial, the judge granted a motion for a directed verdict of innocence.³⁴⁶

C. Burn Pattern Analysis

Madison Hobley (1990): Hobley was convicted and sentenced to death in 1990 for a 1988 fire that claimed seven lives.³⁴⁷ Hobley's conviction rested primarily on Chicago arson investigators' burn pattern interpretation that the fire originated in front of Hobley's apartment.³⁴⁸ In 2001, Dr. Russell Ogle, a

³⁴¹ State v. Krone, 897 P.2d 621 (Ariz. 1995).

³⁴² *Id.* at 621-22.

³⁴³ *Id.* at 622.

³⁴⁴ See Henry Weinstein, *Death Penalty Foes Mark a Milestone*, L.A. TIMES, Apr. 10, 2002, at 1A.

³⁴⁵ See *id.*

³⁴⁶ See Stephanie Salter, *Free, Free at Last*, S.F. CHRON., Sept. 29, 2002, at D6.

³⁴⁷ State v. Hobley, 637 N.E.2d 992 (Ill. 1994).

³⁴⁸ See *id.* at 997; see also State v. Hobley, 696 N.E.2d 313, 319-20 (Ill. 1998) (discussing point of origin evidence); John Conroy, *This Is a Magic Can*, CHI. READER, May 26, 2000 (thoroughly discussing the case and the burn pattern testimony).

fire scientist hired by Hobley's post-conviction attorneys, reevaluated Hobley's case. According to Dr. Ogle, the arson investigators' interpretations were erroneous because they failed to consider several key variables.³⁴⁹ Dr. Ogle opined that the fire originated in the stairwells and that the suspected pour pattern in front of Hobley's apartment was actually caused by the apartment complex's ventilation system.³⁵⁰ Although a Cook County circuit judge denied Hobley's postconviction petition for a new trial, summarily dismissing Dr. Ogle's testimony and other key *Brady* violations,³⁵¹ Dr. Ogle's report played an instrumental role in Governor Ryan's decision to pardon Hobley in January 2003.³⁵²

John Henry Knapp (1975): Knapp was convicted and sentenced to death in 1975 for the 1973 fire that killed his two daughters. Knapp's first trial ended in a hung jury.³⁵³ During both trials, Knapp's version of events (i.e., that the fire was an accident) was declared impossible by fire investigators. To the fire investigators there were telltale signs of a "flammable liquid fire" (i.e., arson). Fire investigators, who had no scientific education or training, relied on unsubstantiated burn pattern myths in concluding that the fire was intentionally set by Knapp. However, before the State's fire expert testified, fire scientists had initiated research regarding a phenomenon known as flashover.³⁵⁴ The State's expert never considered the flashover effect even though the hallmarks of a flashover fire are strikingly similar to those of a flammable liquid fire.³⁵⁵ Knapp's attorneys were also able to debunk other misinterpreted or misleading scientific testimony.³⁵⁶ With this newly discovered evidence, Knapp's conviction was vacated, and a third trial was granted in 1987. His third trial also ended in a hung jury. Before his fourth trial, in a move recommended by

³⁴⁹ See Dr. Russell Ogle's Report (on file with author); see also Steve Mills, *Expert Disputes Cops' Testimony on Gas Can in '87 Fire Fatal to 7*, CHI. TRIB., June 21, 2000, at 5A.

³⁵⁰ See Mills, *supra* note 349.

³⁵¹ See Steve Mills, *Retrial Denied in Fire Deaths; Plea Is Rejected for Man Found Guilty in Killings*, CHI. TRIB., July 9, 2002, at 1.

³⁵² See *Ryan to Pardon*, *supra* note 20 (discussing Hobley's pardon).

³⁵³ *State v. Knapp*, 562 P.2d 704 (Ariz. 1977).

³⁵⁴ Flashover is the "final stage of the process of fire growth; when all combustible fuels within a compartment are ignited, the room is said to have undergone a flashover." JOHN D. DEHAAN, *KIRK'S FIRE INVESTIGATION* 626 (2002).

³⁵⁵ See ROGER PARLOFF, *TRIPLE JEOPARDY: A STORY OF THE LAW AT ITS BEST—AND WORST* (1996) (discussing the flashover concept in detail).

³⁵⁶ Knapp's attorneys debunked the medical examiner's testimony concerning the low levels of carbon monoxide discovered in the children's blood. Low levels indicated nothing with respect to whether a victim was caught in a flashover fire. *Id.* at 230-32. Likewise, his attorneys were able to establish that the State's forensic chemist provided misleading, if not entirely false, testimony whether a chromatograph was "consistent with" Coleman fuel (i.e., a liquid accelerant). *Id.* at 227-30. Contrary to the chemist's original trial testimony, the chromatograph was "not consistent with" and "did not match" a chromatograph of Coleman fuel. *Id.*

the trial judge, Knapp pled no contest—a resolution in which the defendant admits no wrongdoing, but allows the state to record a conviction—in exchange for the fourteen years in prison he had already served.³⁵⁷

D. Firearms Identification

Charles F. Stielow (1915): Stielow was convicted and sentenced to death for the 1915 murders of Charles Phelps and his housekeeper. At trial, the State offered the testimony of Albert H. Hamilton. Hamilton, a self-professed firearms expert, concluded “that the four bullets taken from the bodies of Phelps and his housekeeper had been fired from the revolver owned by Stielow.”³⁵⁸ When George H. Bond was appointed as a special prosecutor to evaluate Stielow’s conviction, he “made a careful study of the ballistics testimony.”³⁵⁹ Bond fired bullets from Stielow’s revolver. He then photographed the discharged bullets and had the photographs enlarged. The difference was apparent, as the bullets extracted from the bodies could not have been fired from Stielow’s revolver.³⁶⁰ In 1918 the Governor of New York ordered Stielow’s release, declaring him an innocent man.³⁶¹

E. Forensic Fraud/Misconduct and Wrongful Capital Convictions

Gary Nelson (1980): Nelson was convicted and sentenced to death in 1980 for the rape-murder of six-year-old Valerie Armstrong.³⁶² Nelson’s conviction was “based upon circumstantial evidence.”³⁶³ A hair found on Valerie’s body had been examined by Roger Parian of the Georgia Bureau of Investigation. Parian concluded that “the hair . . . on the body and the known hair from the arm of Gary Nelson ha[d] . . . the same origin.”³⁶⁴ The examiner added that the hair could only have originated from approximately 120 people in the entire Savannah area.³⁶⁵ Nelson’s appellate attorneys discovered that Parian perjured

³⁵⁷ See *id.* at 396. Knapp took the plea because he originally confessed to setting the fire. See also Roger Parloff, *They Still Want to Kill Him*, AM. LAWYER, July-Aug. 1991, at 80. He later recanted his confession.

³⁵⁸ EDWIN M. BORCHARD, CONVICTING THE INNOCENT 242 (1932); see also Rob Warden, *The Revolutionary Role of Journalism in Identifying and Rectifying Wrongful Convictions*, 70 UMKC L. REV. 803, 826-29 (2002) (discussing Stielow’s case).

³⁵⁹ BORCHARD, *supra* note 358, at 247-48.

³⁶⁰ See *id.* at 248.

³⁶¹ See *id.* at 249.

³⁶² *Nelson v. State*, 274 S.E.2d 317 (Ga. 1981).

³⁶³ *Nelson v. Zant*, 405 S.E.2d 250 (Ga. 1991).

³⁶⁴ Monroe Freedman & Howard Lichtenstein, *Pale Horse, Pale Justice*, CONN. L. TRIB., Mar. 30, 1992, at 20; see also *Nelson*, 274 S.E.2d at 319; Laura Frank & John Hanchette et al., *Convicted on False Evidence?: False Science Often Sways Juries, Judges*, USA TODAY, July 19, 1994, at 1A (discussing Nelson’s case).

³⁶⁵ *Nelson*, 405 S.E.2d at 252.

himself. He never examined the hair but forwarded it to the FBI's crime lab in Washington, D.C. More significantly, the FBI report to Parian concluded that "[t]he hair is not suitable for significant comparison purposes," and that the hair in question "could have come from any black person, including, but not limited to, other suspects in this case or the victim."³⁶⁶ In 1991, after eleven years on death row, the Georgia Supreme Court freed Nelson when it granted his writ of habeas corpus because Nelson's defense was not made privy to this information and other exculpatory evidence.³⁶⁷ Georgia did not attempt to retry Nelson. As Chatham County District Attorney Spencer Lawton acknowledged, "There is no material element of the state's case in the original trial which has not subsequently been determined to be impeached or contradicted."³⁶⁸

Dale Johnston (1984): Dale Johnston was convicted and sentenced to death for Annette Cooper and Todd Schultz's 1982 murders. Investigators had no solid physical evidence linking Johnston to the crime. All they had was an alleged foot or boot print from the riverbank where the victims' bodies were discovered. William Bodziak, the FBI's top impression examiner, was unable to determine whether the impression was of a boot or a bare foot.³⁶⁹ Nonetheless, Dr. Louise Robbins was able to link Johnston to the *boot* print.³⁷⁰ In 1986, the Ohio Court of Appeals reversed the conviction not because of the boot print testimony but because hypnotically induced testimony was improperly admitted.³⁷¹ In 1988, the Ohio Supreme Court affirmed the appellate court's decision.³⁷² In 1990, the Ohio Court of Appeals held that investigators unlawfully seized Johnston's boots during their initial investigation and thus ordered the boot's suppression at Johnston's retrial.³⁷³ Because prosecutors were barred from admitting into evidence the boot on which Robbins based her identification, they chose not to retry Johnston. As a result, Johnston was released from death row in 1990.³⁷⁴

³⁶⁶ Freedman & Lichtenstein, *supra* note 364.

³⁶⁷ Nelson v. Zant, 405 S.E.2d 250 (Ga. 1991).

³⁶⁸ Freedman & Lichtenstein, *supra* note 364.

³⁶⁹ See Hansen, *supra* note 135, at 64.

³⁷⁰ See *supra* notes 135-38 and accompanying text (discussing Dr. Robbins' questionable footprint and shoeprint identification technique).

³⁷¹ State v. Johnston, No. 425, 1986 WL 8798 (Ohio Ct. App. Aug. 6, 1986).

³⁷² State v. Johnston, 529 N.E.2d 898 (Ohio 1988).

³⁷³ State v. Johnston, 580 N.E.2d 1162, 1168-70 (Ohio Ct. App. 1990).

³⁷⁴ See William S. Lofquist, *Whodunit? An Examination of the Production of Wrongful Convictions*, in *WRONGLY CONVICTED: PERSPECTIVES ON FAILED JUSTICE* 174, 174-96 (Saundra D. Westervelt & John A. Humphrey eds., 2001) (discussing Johnston's case).

APPENDIX B. QUESTIONABLE CAPITAL CONVICTIONS AND FORENSIC SCIENCE

Michael Lee McCormick (1987), Hair Identification: McCormick was convicted and sentenced to death in 1987 for Donna Jean Nichols' 1985 murder. A hair found at the crime scene was used to convict McCormick.³⁷⁵ DNA testing that was not available at the time now indicates the hair does not belong to McCormick.³⁷⁶ McCormick is currently awaiting a retrial.³⁷⁷

Ernest Willis (1987), Burn Pattern Analysis: Willis was convicted and sentenced to death for the arson deaths of Betsy Beleu and Gail Allison.³⁷⁸ Arson investigators found no flammable liquids at the scene or on Willis' clothing; no witnesses saw Willis near the scene; and no motive was ever uncovered for the killings. Yet arson investigators theorized that marks on the floor were "pour patterns," suggesting that an accelerant, like gasoline, had been used. Prosecutors argued that the so-called pour patterns indicated that Willis dumped accelerant throughout the house. The anecdotal burn pattern theories on which investigators relied on have since been debunked.³⁷⁹

Jorge Villanueva (1994), DNA Analysis: Villanueva was sentenced to death for the 1994 murder of 77-year-old Maria Jova Montiel. Blood and hair found at the scene that proved significant during Villanueva's trial are proving to be equally noteworthy during his appeal. The tests, or lack thereof, and conclusions drawn by a Houston crime lab analyst have been called into serious question.³⁸⁰ Recent DNA testing demonstrates that what was depicted as blood on Villanueva's shoe at trial may in fact have been organic fertilizer. Tests performed on pubic hairs discovered at the scene were also insufficiently conducted, as the analyst tested only one genetic region of the hairs even though up to seven regions could have been, and generally are, assessed.³⁸¹ Two other crime scene hairs that differed from both Villanueva's and Montiel's were never tested nor forwarded to the lab's DNA section. The analyst also

³⁷⁵ McCormick v. State, No. 03C01-9802-CR-00052, 1999 WL 394935, at *2 (Tenn. Crim. App. June 17, 1999).

³⁷⁶ See *DNA Tests Negate Hair Evidence in Murder Conviction; McCormick on Death Row for 1985 Killing*, CHATTANOOGA TIMES FREE PRESS, Apr. 9, 2001, at B1.

³⁷⁷ See Brian Lazenby, *Judge to Rule on Statements for Retrial*, CHATTANOOGA TIMES FREE PRESS, Sept. 4, 2003, at B1.

³⁷⁸ See Michael Hall, *Death Isn't Fair*, TEX. MONTHLY, Dec. 2002, at 122.

³⁷⁹ See Lentini, *supra* note 269 (discussing the fire testing that debunked many of the myths surrounding burn pattern analysis and the behavior of fire).

³⁸⁰ See Steve McVicker & Roma Khanna, *Case Gets 2nd Look After Lab Misssteps; DNA Work, Police Tactics in Question*, HOUS. CHRON., May 4, 2003, at A1.

³⁸¹ A single-region match could have included 4.9% Caucasians, 5.3% blacks, and 3.4% Hispanics. Essentially, then, the limited identification testimony provided by the analyst would have coincided with 136,000 individuals in Harris County, Texas. *Id.*

neglected to test material pieces of evidence.³⁸² Moreover, the analyst reported the hair and DNA statistical probabilities only for the defendant's ethnic group (i.e., Hispanic population), which could have easily misled jurors about the strength of the hair or DNA evidence.³⁸³

Nanon Williams (1993) and Johnnie Bernal (1995), Firearms Identification: In these cases, the same Houston crime lab firearms examiner utilized "unsound" methods to render his identifications.³⁸⁴ Williams was convicted and sentenced to death for a 1992 shooting. During his trial, the examiner testified that the victim was shot with a .25-caliber bullet. When the prosecutor asked the examiner if there was "any way in this world" the bullet could have come from a codefendant's .22-caliber Derringer, the examiner said no. However, six years later, the same examiner said it was obvious that the bullet was in fact a .22-caliber from a codefendant's handgun. The same examiner testified in Bernal's 1995 capital trial. The examiner testified that the fatal bullet came from a firearm Bernal had in his possession when authorities arrested him. The examiner nonetheless testified that he fired Bernal's handgun *twenty-five* times and used a solvent on the barrel before he was able to conclude that there was a match.³⁸⁵

Kenny Richey (1986), Burn Pattern Analysis: Kenny Richey has spent sixteen years on Ohio's death row after being convicted of starting a fire that killed two-year-old Cynthia Collins in 1986.³⁸⁶ Assistant State Fire Marshall Robert Cryer initially concluded that a malfunctioning electric fan accidentally caused the fire. During the trial, though, Cryer testified that the fire was purposely set. Cryer altered his initial opinion for two reasons. First, the crime lab reported that traces of accelerants were detected in the victim's living room carpet.³⁸⁷ Second, the "burn or pour patterns on the cement floor beneath the carpet and on the wooden porch . . . led him to conclude that the fire was arson related."³⁸⁸ Several facts, however, surfaced after Richey's conviction that

³⁸² For example, even though bloodstains were identified on four different types of shoes, the analyst chose only to test one of them. See Roma Khanna & Steve McVicker, *2 HPD Crime Examiners' Major Errors Enumerated*, HOUS. CHRON., June 14, 2003, at A31.

³⁸³ For instance, DNA tests may reveal that a crime scene sample is consistent with only 1 in 100,000 Hispanics, but it may also be consistent with 1 in 30 blacks. As Dr. Elizabeth Johnson strongly argues, to report the statistics only for Hispanics "has absolutely nothing to do with the origin of the evidence of how many people in the Houston metropolitan area could have deposited the evidence." *Id.*

³⁸⁴ See Roma Khanna, *Cases Cast Doubt on Ballistics Work at HPD Lab*, HOUS. CHRON., Mar. 23, 2003, at A1.

³⁸⁵ See *id.*

³⁸⁶ *State v. Richey*, No. 12-87-2, 1989 WL 156562 (Ohio Ct. App. Dec. 28, 1989).

³⁸⁷ *Id.* at *6.

³⁸⁸ *Id.*

raised serious questions about the validity of the crime lab tests.³⁸⁹ Moreover, top fire scientists have indicated to Richey's post-conviction attorneys that "no evidence exists that meets with the best scientific practice to prove there were traces of either petrol or paint stripper used in the house."³⁹⁰ The experts have also cast significant doubts on Cryer's testimony. During the trial, Cryer opined that given the depth and breadth of the burn patterns, Richey probably used a quart of accelerants. According to the fire scientists, at least ten gallons would have been required to create the patterns Cryer described.³⁹¹ Richey is currently awaiting a decision on his most recent appeal concerning this new evidence.

Michael Rivera (1987), Hair Identification: Rivera was convicted of capital murder in 1987 for the 1986 murder of eleven-year-old Staci Jazvac.³⁹² The primary evidence linking Rivera to Jazvac was two strands of hair. Prosecutors argued and a crime lab examiner testified that the hairs originated from Jazvac.³⁹³ While questions have always been raised concerning Rivera's guilt, they may have been answered in March 2003 when mitochondrial DNA testing conclusively proved that the two strands of hair did not come from Jazvac.³⁹⁴ Moreover, subsequent mitochondrial tests have also demonstrated that four hairs discovered on Jazvac's body did not originate from Rivera or Jazvac. At least half of the jurors, who helped send Rivera to death row sixteen years ago, now say that they would have voted to acquit Rivera if they were afforded the available scientific evidence today.³⁹⁵

Anthony Ray Hinton (1985), Firearms Identification: Hinton was convicted in 1985 for the capital murders of John Davidson and Thomas Wayne Vason.³⁹⁶ Davidson and Vason were both victims of robbery-homicides. During the course of Davidson's and Wayne's autopsies, the medical examiner recovered four .38 caliber bullets (two from Davidson and two from Vason).³⁹⁷ The

³⁸⁹ For instance, at some point subsequent to the fire, the carpet was removed from the victim's residence by the manager of the apartment complex and was taken to a dump site. Investigators retrieved the carpet from the dump site thirty-six hours after the fire. Moreover, samples from the carpet were not taken until two or three weeks later. Lastly, in the course of obtaining the samples, the carpet was laid out in the sheriff's department parking lot. *See id.* at *7.

³⁹⁰ Fiona Macgregor, *New Bid to Prove Richey Is Innocent of Killing*, EVENING NEWS (Edinburgh, Scot.), May 7, 2003 (quoting Richey's post-conviction attorneys).

³⁹¹ *See id.*

³⁹² *Rivera v. State*, 561 So. 2d 536 (Fla. 1990).

³⁹³ *See* Wanda J. DeMarzo & Daniel de Vise, *DNA Tests Cast Doubt on '87 Murder Verdict*, MIAMI HERALD, Mar. 21, 2003, at 1B.

³⁹⁴ *See id.*

³⁹⁵ *See* Wanda J. DeMarzo & Daniel de Vise, *Scientific Evidence May Have Helped Sway Jurors; New Technology Might Have Given Jurors Who Sent Michael Rivera to Death Row a Reason to Acquit*, MIAMI HERALD, Nov. 30, 2003, at 1A.

³⁹⁶ *Hinton v. State*, 548 So. 2d 547, 550 (Ala. Crim. App. 1988).

³⁹⁷ *See id.* at 551.

Alabama Department of Forensic Sciences (ADFS) determined that the bullets taken from Davidson and Vason's heads were fired from the same weapon.³⁹⁸ During the course of their investigation, Hinton's mother provided investigators with a .38 caliber Smith & Wesson pistol she owned. After test firing the pistol, ADFS examiners concluded that the gun owned by Mrs. Hinton was the one responsible for the two robbery-homicides.³⁹⁹ Last year, however, Hinton's attorneys requested that the Alabama State Supreme Court reconsider Hinton's conviction based on the findings of three firearms examiners who insist that the bullets from the two shootings cannot be matched to Mrs. Hinton's gun.⁴⁰⁰

Michael Blair (1984), Hair Identification: Blair was convicted and sentenced to death in 1994 for eleven-year-old Ashley Estell's murder.⁴⁰¹ The key piece of evidence linking Blair to Estell's murder was a hair found on the floorboard of Blair's car. A forensic examiner testified that the floorboard hair microscopically matched Estell's hair.⁴⁰² In June 2000, post-conviction DNA tests showed that the hair could not have originated from Estell.⁴⁰³ Moreover, a second round of post-conviction testing in 2002 revealed that the hair could not have originated from either Estell or Blair.⁴⁰⁴ Blair is currently waiting to see whether the Texas Court of Criminal Appeals will grant him a new trial.

Kennedy Brewer (1995), Bitemark Identification: Questions have recently been raised with respect to Dr. Michael West's testimony in Brewer's death penalty case. In 1995, West testified that Brewer's bite pattern matched those on the body of Brewer's girlfriend's daughter, who was strangled and raped in 1992. Brewer was convicted and sentenced to death. Nevertheless, DNA testing conducted in July 2001 revealed that the biological evidence collected from the rape kit did not match Brewer's DNA. Additionally, Richard Souviron, another forensic dentist who examined the alleged bite marks, claims that the marks are not even human in origin and were most likely inflicted by insects.⁴⁰⁵ With this

³⁹⁸ See *id.*

³⁹⁹ See *id.* at 553.

⁴⁰⁰ See Adam Liptak, *Experts Question Verdict, But the State Is Unmoved*, N.Y. TIMES, Feb. 24, 2003, at A15; *Vindicating a Verdict; Hinton Case Merits a Closer Look by Prosecutors*, BIRMINGHAM NEWS, June 30, 2002 ("Three pedigreed experts—including the retired chief of the FBI's firearm and toolmark identification unit—gave testimony that raised substantial questions about the ballistics evidence that was a cornerstone of Hinton's conviction.").

⁴⁰¹ See Holly Becka, *Hair Test Can't Link Inmate, Girl; Strand Not That of Ashley Estell or Man; DA Still Unconvinced*, DALLAS MORNING NEWS, Oct. 4, 2002, at 1A.

⁴⁰² See Holly Becka, *Lab Starts DNA Tests in Blair Case: Microscope Hair Comparison Was Used to Convict Man in Girl's Slaying*, DALLAS MORNING NEWS, Jan. 19, 2001, at 31A.

⁴⁰³ See *id.*

⁴⁰⁴ See *DNA Casts Doubt on Convict*, AP ONLINE, Oct. 4, 2002, available at 2002 WL 101073330.

⁴⁰⁵ See Andrew Murr, *A Dentist Takes the Stand*, NEWSWEEK, Aug. 20, 2001, at 24.

new evidence, Brewer sought a new trial.⁴⁰⁶ Despite the DNA evidence, the Mississippi Supreme Court denied Brewer's request for a new trial. Instead, the Supreme Court granted an evidentiary hearing to determine whether the DNA results warranted a new trial for Brewer.⁴⁰⁷ In September 2002, a Mississippi Circuit Court awarded Brewer a new trial after his evidentiary hearing.⁴⁰⁸

Brett Bogle (1991), Hair Identification: Bogle was convicted for the 1991 rape-murder of his girlfriend's sister in Tampa, Florida. At trial, FBI examiner Michael Malone testified that two head hairs and one pubic hair found on Bogle's clothing belonged to the victim. The pubic hair allegedly tied Bogle to the rape. Consequently, because the victim was supposedly raped before she was murdered, Bogle was convicted of aggravated capital murder. Nearly nine years after his conviction and death sentence, an independent scientist concluded that the pubic hair was actually a third head hair from the victim. The scientist also concluded that Malone's work was not adequately documented and his testimony was inconsistent with his lab notes.⁴⁰⁹

Michael Mordenti (1991), Hair Identification: Mordenti has long maintained that FBI examiner Michael Malone helped railroad him onto death row for a crime he did not commit. A 2001 Justice Department Report appears to support Mordenti's claim. The report showed that Malone gave unacceptable testimony in 1991 when Mordenti was convicted of accepting \$17,000 to murder Thelma Royston.⁴¹⁰ Malone was asked to testify to strengthen a highly circumstantial case against Mordenti. There was no murder weapon, no eyewitness, and no physical evidence. The State's only witness that implicated Mordenti in the murder-for-hire plot was his ex-wife, Gail, who received immunity for her testimony.

Malone compared hairs found on the victim's clothing with hair samples from Mordenti and could not come up with anything incriminating. Nonetheless, under the prosecutor's direction, Malone testified that simply because he could not make a match did not mean that Mordenti was not present at the crime scene. Steve Robertson, the forensic examiner hired by the Justice Department to reexamine Malone's testimony, concluded that Malone overstated the significance of his test results and testified beyond his expertise.

⁴⁰⁶ See Sherri Williams, '60 Minutes' Focuses on Dentist, CLARION-LEDGER (Jackson, Miss.), Feb. 17, 2002, at 1B.

⁴⁰⁷ See *Brewer v. State*, 819 So. 2d 1169 (Miss. 2002); Sherri Williams, *Despite DNA, No Retrial Set*, CLARION-LEADER (Jackson, Miss.), June 7, 2002, at 1B.

⁴⁰⁸ See Sherri Williams, *DNA Wins Inmate New Trial*, CLARION-LEDGER (Jackson, Miss.), Sept. 6, 2002, at 1B.

⁴⁰⁹ See Richard A. Serrano, *Florida Death Row Inmate's Life Hinges on Single Hair*, L.A. TIMES, Aug. 17, 2000, at A26.

⁴¹⁰ See Sydney P. Freedberg, *Reports Highlight More Tainted Testimony*, ST. PETERSBURG TIMES, May 3, 2001, at 1A.

Mordenti's appellate attorneys have criticized another FBI lab examiner who supposedly provided scientifically invalid and misleading testimony about comparative bullet lead analysis evidence. The expert testified that the bullets pumped into Royston's body came from the same box of bullets that Gail Mordenti said she received from her husband.⁴¹¹

⁴¹¹ See Dong-Phuong Nguyen, *Condemned Man Fights Conviction*, ST. PETERSBURG TIMES, Nov. 7, 2001, at 3B; see also *supra* notes 298-306 and accompanying text (discussing CBLA's questionable scientific foundation).