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Source: *Law & Social Inquiry*, Vol. 34, No. 3 (Summer, 2009), pp. 603-633

Published by: Wiley on behalf of the American Bar Foundation

Stable URL: <http://www.jstor.org/stable/40539373>

Accessed: 10-10-2017 09:16 UTC

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## Science and the Death Penalty: DNA, Innocence, and the Debate over Capital Punishment in the United States

Jay D. Aronson and Simon A. Cole

*The death penalty debate in the United States has recently undergone a fundamental shift. The possibility of executing the innocent has emerged as some abolitionists' most salient argument, displacing debates over such issues as fairness, deterrence, and cost. Innocence has managed to move to the fore of the debate in part because of the success of death penalty opponents in attaching epistemological certainty to one particular category of postconviction exonerations, those vouched for by the authority of DNA evidence. We suggest that such moves are primarily rhetorical because, while DNA evidence may be more accurate and reliable than other forensic science, it still fundamentally probabilistic in nature and is prone to uncertainties at all stages of its production. Yet, because of the certainty attached to DNA evidence in public discourse, it can be used as a lever with which to challenge law's claims to truth-making authority, and to undermine public trust in the death penalty. A few abolitionists and other scholars have expressed misgivings about the abolitionist embrace of the innocence argument. We push this concern further, suggesting that both abolitionists and death penalty reformers, who seek to promote a "scientific" death penalty centered on DNA evidence, draw upon a mythologized notion of "science" as a producer of epistemic certainty.*

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The authors wish to thank Austin Sarat, Franklin Zimring, and five anonymous referees for their constructive comments.

This material is partially based upon work supported by the National Science Foundation under Grant Nos. SES-0115305 and IIS-0527729, and the National Institutes of Health under Grant No. HG-03302. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation or the National Institutes of Health.

Eighty-four years ago, Judge Learned Hand observed that “[o]ur procedure has been always haunted by the ghost of the innocent man convicted,” but posited, optimistically, that “[i]t is an unreal dream” (*United States v. Garsson*, 291 F. 646, 649 (S.D.N.Y. 1923)). Today, with the advance of forensic DNA technology, our desire to join Learned Hand’s optimism has given way to the reality of wrongful convictions—a reality which challenges us to reaffirm our commitment to the principle that the innocent should be freed.

Judge Calabresi (*McKithen v. Brown* 2007, 2–3)

## INTRODUCTION

This article focuses on the recent “turn to innocence” in American death penalty discourse. Although death penalty discourse has always been, and remains, multifaceted—encompassing morality, religion, cost, deterrence, theories of punishment, fairness, race, class, and human rights—we suggest that over the past decade innocence has emerged as perhaps the dominant issue in death penalty discourse with “an unprecedented effect on the debate about capital punishment” (Bandes 2008, 5; Baumgartner, De Boef, and Boydston 2008, 157). This phenomenon has been referred to by such labels as the “age of innocence” (Rosen 2006, 237) or even an “innocence revolution” (Marshall 2004, 573; Steiker and Steiker 2005, 613). The abolitionist movement has embraced innocence as a new rhetorical asset in the death penalty debate, one with the potential to decisively shift the weight of public opinion in abolition’s favor (Radelet and Borg 2000; Bedau 2004a; Acker 2009). “Unlike other challenges to the fairness of capital proceedings, which have failed to stimulate widespread public outrage,” Marshall (2004) argues, “evidence of the system’s propensity to factual error has the power to open closed minds and trigger reexamination of the costs and benefits of capital punishment” (579). Banner (2002) notes, “the prospect of killing an innocent person seemed to be the one thing that could cause people to rethink their support for capital punishment” (304). He goes on to suggest that “if any development had the potential to change” the popularity of the death penalty, “this was the one” (305). Thus, one scholar claims, “it is no exaggeration to say that wrongful convictions spurred . . . the most successful death penalty reform movement in our lifetime” (Bandes 2008, 4).

Already, scholars claim that innocence “has produced a massive shift in the terms of the national death-penalty debate” (Hoffman 2005, 562), a shift “away from moral and procedural considerations, and toward the more substantive question of guilt and innocence” (Hall 2005, 373). Even the strongest supporters of the death penalty acknowledge this trend. Joshua Marquis, vice president of the National District Attorneys Association, stated, “We’re seeing fewer executions. We’re seeing fewer people sentenced to death.

People really do question capital punishment. The whole idea of exoneration has really penetrated popular culture" (quoted in Liptak 2007, A1).

Innocence has become a powerful argument in death penalty discourse over the past decade because abolitionists have been able to point to the near-execution of inmates whose innocence is supported by postconviction DNA tests. In contrast to earlier debates about the potential execution of innocent people, the cultural authority afforded to DNA evidence as a "truth machine" (Kreimer 2005, 655) that generates "scientific answers to the question of guilt or innocence" (Rosen 2003, 68) has effectively ended debates about whether or not particular exonerated condemned inmates were factually innocent. "The advent of DNA testing," Bandes (2008) notes, "offers the promise of innocence as an entity with clearly delineated boundaries, discoverable by scientific means" (9). In effect, some abolitionists have used the cultural authority of science, in the form of postconviction DNA testing, to win broad social acceptance of the notion that the state has nearly executed factually innocent people, may well have executed some factually innocent people, and stands at risk to eventually execute a factually innocent person if capital punishment continues. As one leading abolitionist scholar puts it, "the innocence revolution is born of science and fact, as opposed to choice among a competing set of controversial values" (Marshall 2004, 574).

The issue of innocence played a central role in the New York State legislature's failure to reinstate the death penalty after it was overturned on a constitutional violation (Purnick 2004; Duggan 2005; Healy 2005; Lentol, Weinstein, and Aubry 2005). On March 18, 2009, Governor Bill Richardson signed a law repealing the death penalty in New Mexico. Innocence was singled out as the most important reason for his decision, although given recent economic turmoil, cost was also noted as a significant factor. Innocence was one of two principal reasons behind the American Bar Association's landmark call for a moratorium on capital punishment in 1997 (American Bar Association 1997). The issue of wrongful conviction (highlighted by several prominent DNA exonerations in the state) was given pride of place in Governor George Ryan's rationale for his historic clearing of Illinois' death row in 2003 (Sarat 2006, 276).<sup>1</sup> Actual innocence, Sarat notes, was "the issue that drew his [Ryan's] most intense attention" and provided him with an entrée into other crucial issues, such as fairness (275).

Perhaps the most powerful impact of the innocence argument was felt in the case *United States v. Quinones* (2002b), in which federal district Judge Jed

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1. As Sarat and Hussain (2004) point out, imputing a coherent rationale to Ryan's actions is difficult because of his tendency, in his public statements, to invoke all possible rationales, including some philosophically inconsistent with one another. Most notable in this regard was Ryan's invocation of the retributivist reasoning to commute all Illinois death sentences was that life in prison was a punishment worse than death.

Rakoff ruled that evidence concerning the near-execution of factually innocent people rendered capital punishment unconstitutional. Although the decision was subsequently overturned by the Second Circuit Court of Appeals in 2002, the *Quinones* (2002b) opinion disseminated the notion that the risk of executing the innocent might render capital punishment unconstitutional. Rakoff's reasoning was subsequently adopted by four dissenting US Supreme Court justices, who called judicial awareness of DNA exonerations "a new body of fact" that "must be accounted for in deciding what, in practical terms, the Eighth Amendment guarantees should tolerate" for capital punishment (*Kansas v. Marsh* 2006, 2544). The "repeated exonerations of convicts under death sentences, in numbers never imagined before the development of DNA tests," the dissenters argued, have ushered in "a period of new empirical argument about how 'death is different'" (2544–45, Souter, J., dissenting).

Some scholars have expressed reservations about the turn to innocence or about "the new abolitionism" more generally (Steiker and Steiker 2003). These scholars have noted that the focus on actual innocence may distract from other important problems with capital punishment and with the American criminal justice system more generally, such as overpunishment, fairness, and race (Raymond 2001; Davis 2003; Steiker and Steiker 2005; Berman 2006; Sarat 2006). In this article, we want to focus on a different, less explored (but see Bandes 2008), issue: the use of the cultural authority of science in the turn to innocence.

Scholars have worried that, as Liebman (2002) puts it, "What DNA giveth the death penalty reform impulse . . . DNA reform can taketh away" (549). Indeed, little more than a year after *Quinones* (2002b), the cultural authority of DNA evidence was turned against abolition. In 2003, in a proposal often dubbed "the guilty project" (an ironic counterpart to the Innocence Project), Massachusetts Governor (and later presidential candidate) Mitt Romney drew on the cultural authority of DNA evidence to support reforming and rejuvenating capital punishment rather than abolishing it. Just as some abolitionists argued that exculpatory DNA evidence provided epistemological certainty that states had at least come close to executing factually innocent persons, Romney argued the incriminating DNA evidence could provide epistemological certainty of the guilt of candidates for execution.

This article is a study of the rhetorical invocation of science and innocence (particularly exonerations involving DNA evidence) in the American capital punishment debate. We argue that associating a particular factual or normative claim with DNA evidence is a way of seeking to have that claim treated as "scientific" and therefore indisputably and unassailably "true." Such rhetorical invocations draw on caricatures of DNA profiling as a purportedly infallible "truth machine," which perpetuates a notion of "science" as a category of knowledge characterized by epistemological certainty that

somehow justifies taking what would otherwise be viewed as risky legal actions (i.e., the freeing of a convicted murderer or the execution of an accused murderer). Although this notion does not reflect most academic and philosophical views of science (which tend to emphasize the provisional and probabilistic nature of scientific knowledge), it is representative of the rhetorical use of “science” in law more broadly. Law’s tendency to attribute epistemological certainty to many forms of science, we suggest, is an indication of law’s uneasiness with its own role in making life and death decisions under conditions of uncertainty (Golan 2004).

The use of the rhetorical authority of science to advance abolitionist arguments is perhaps necessary, but it also carries risks for the abolitionist. The first is that DNA evidence is a double-edged sword: the epistemic certainty that defense advocates claim when using it to exonerate the wrongfully convicted can easily be turned against the abolitionist project by increasing the public’s perception that those being executed on the basis of DNA evidence are, without a doubt, worthy of execution. Second, such arguments perpetuate and strengthen the *myth* of epistemic certainty surrounding the technique.

To be sure, DNA profiling is different in many ways than previous forensic techniques. Because it emerged out of academic science rather than the police laboratory, there was a large pool of academically credentialed witnesses who were able to testify on behalf of the prosecution or defense in court (Aronson 2007; Mnookin 2001). In contrast to, say, fingerprinting, frequency data is available from which it is possible to generate estimates of the probability of a random match between two profiles. However, even though the stated practice of forensic laboratories is based on settled understandings of DNA identification techniques, the actual production of DNA evidence is, like all other human activities (including basic scientific research), subject to error (e.g., sample contamination or mix-up), bias, unspoken practices, and even corruption.

Our findings are based on an analysis of voluminous contemporary discourse on the death penalty—including judicial opinions, scholarly work, media reports, and public statements by government officials. Our approach to this material is grounded in Science & Technology Studies (STS). Methodologically, this means that we do not seek to define what counts as “science” ourselves or arbitrate which knowledge claims or knowledge-producing activities are or are not properly called “science” or are better than others. While we recognize that not all knowledge claims that purport to be science are equal,<sup>2</sup> it is not our mission in this article to evaluate which forms

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2. For the record, we do think that certain forensic techniques are more accurate and reliable than others but that none are infallible. Unfortunately, there is a dearth of data that would allow an external observer to know the relative accuracy of various techniques (Giannelli 2007).

are better or worse than others or to demarcate “science” from “pseudo-science.” Rather, we are interested in the use of the terms “science” and “scientific” as rhetorical assets in discourse over the death penalty.

## THE AGE OF INNOCENCE

Opposition to capital punishment in Anglo-American law began as early as the seventeenth century among English radicals and Quakers (Banner 2002) and as early as the eighteenth century on the continent (Zimring 2003). American abolitionists did use the innocence argument during the nineteenth century, but, for the most part, the morality of capital punishment took center stage (Banner 2002; Warden 2005). During the 1960s, the National Association for the Advancement of Colored People (NAACP) Legal Defense Fund, placing hope in the Warren Court, treated capital punishment as a constitutional issue. Innocence was mentioned in only one (Justice Marshall’s) of the nine opinions in *Furman v. Georgia*, which invalidated American death penalty statutes in 1972. Even in Marshall’s opinion, however, innocence was mentioned “only as the last of numerous considerations that might turn informed public opinion against the death penalty” (Steiker and Steiker 2005, 593). After the reinstatement of the death penalty (*Gregg v. Georgia* 1976), fairness became perhaps the most salient issue, at least until the Court turned a deaf ear on the argument that capital punishment was inherently unfair because it was meted out in a racially discriminatory manner (*McCleskey v. Kemp* 1987).

During the mid-1980s and early 1990s, abolitionists embraced cost as an argument to convince even those Americans who did not share their moral compass to turn against the death penalty (Dieter 1994). Although cost is still an issue (see Liebman 2002), it has not strongly swayed public opinion in any particular direction. During the 1970s (and continuing today in academic literature), a battle has been waged about the deterrent effect of the death penalty (Forst 2004). But it appears unlikely that social scientific evidence concerning deterrence, even if it were not as equivocal as it is, would change many minds because of the moral nature of the death penalty debate (Gross and Ellsworth 2003). As Weisberg (2005) suggests, the “human reality” of innocence “may prove to be more important than masses of social science evidence on deterrence and other issues in determining support for the death penalty in the long run” (168).

Although many of these issues remain actively contested and new, previously unforeseen issues have gained traction (e.g., the current attention to methods of execution), empirical evidence suggests that innocence has emerged as “the most powerful new set of arguments ever to enter” the death penalty debate (Baumgartner, De Boef, and Boydston 2008, 135). But why has the death penalty debate not *always* been about the possibility of

executing innocent people? Cases of executed innocents have long been known; they arguably played a role in prompting abolition in some jurisdictions, such as Michigan in 1846 (Clarke, Lambert, and Whitt 2000–2001), and abolitionists have long tracked cases of the execution of allegedly innocent people.<sup>3</sup>

The answer, we would suggest, is that with a few exceptions (Warden 2005), cases of innocence have always been contestable. This can be most clearly demonstrated by the controversy over the Bedau and Radelet's massive study (1987) of 350 known wrongful convictions in "potentially capital cases" (i.e., cases for which the death penalty could have conceivably been handed down even if it ultimately was not) from 1900–1985.<sup>4</sup> They conducted this study both to put the study of wrongful conviction on firm empirical grounding and to make it impossible for death penalty proponents to claim that there was little or no risk of executing innocent individuals. Ultimately, they found that 139 factually innocent people were sentenced to death, 23 of them were eventually executed, and 22 had close calls (i.e., coming within days or hours of execution).

While Bedau and Radelet's study greatly advanced wrongful conviction scholarship, it remained vulnerable to several epistemological critiques, most notably (1) subjectivity in the choice and description of cases (Markman and Cassell 1988); (2) the irony that innocence claims depended on the same kind of evidence that was often cited as a primary cause of wrongful convictions—another person's confession, the implication of another person, a state official's declaration, and "subsequent scholarly judgment" (i.e., expertise) (Markman and Cassell 1988); and (3) the lack of evidence to prove *factual* innocence (that the convicted individual was not the perpetrator of the crime) as opposed to *legal* innocence (that the convicted individual may or may not have been the perpetrator of the crime, but he is not legally convictable for the offense because of a constitutional or procedural error).

Anticipating such criticisms, Bedau and Radelet (1987) made clear the difficulty in definitively establishing innocence in the postconviction context. They wrote that the "most one can hope to obtain is a consensus of investigators after the case reaches its final disposition" (47). They went on to state that their criterion for inclusion in their catalogue was a belief that "a majority of neutral observers, given the evidence at our disposal, would judge the defendant in question to be innocent" (47). Generous death penalty proponents concede that since there is essentially no legal proceeding capable

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3. Anti-death penalty activists and organizations have been keeping track of death row exonerations since at least 1932, when Yale University law professor Edwin Borchard profiled sixty-five cases of known wrongful conviction in *Convicting the Innocent* (1942 [1932]).

4. When they revised and expanded their initial *Stanford Law Review* article into book form in 1992, their database increased to 416 (Radelet, Bedau, and Putnam 1992).



of producing a finding of “innocence,” it is not surprising that ironclad evidence of innocence is difficult to come by (Latzer 2003).

Death penalty proponents could, therefore, neutralize innocence arguments by claiming to be unconvinced of the actual innocence of one, or most, or all of the claimed instances of execution of innocents. They could further use the tactic of casting doubt on the weakest of the claimed innocence cases and thus undermine the remainder by insinuation (Risinger 2007). Some abolitionists have suggested that they erred by allowing death penalty proponents to define “innocence” in a manner so epistemologically exacting as to be impossible to satisfy (Warden quoted in Lutton 2000; Radelet 2001).

### A NEW KIND OF EXONERATION

In 1989, however, a new kind of exoneration occurred, one that was much less vulnerable to skepticism than those that came before it. On August 14 of that year, Gary Dotson, who had been convicted of rape in 1979, became the first American prisoner to be cleared by postconviction DNA testing. Although the supposed victim had a crisis of conscience when she became a born-again Christian and recanted her story in 1985 on national television (Serrill 1985), Dotson was not formally declared innocent for nearly four years. Instead, he was merely paroled early without the conviction being expunged from his record. Subsequent investigation into his case revealed that he had been convicted based on questionable forensic evidence (both hair analysis and blood typing), false testimony of the victim, and unsubstantiated claims about the character of the victim and the defendant made by the prosecutor.<sup>5</sup>

By 1996, sixty-five people had been exonerated on the basis of DNA evidence. These cases were detailed in a National Institute of Justice report titled *Convicted by Juries, Exonerated by Science* (Connors et al. 1996). The title presaged the invocation of the authority of “science” that has become so commonly associated with postconviction DNA exoneration. The phrase “exonerated by science” set up an opposition between law and science, and a presumption of epistemic privilege for science that would set the tone for the discourse in the years to come. In 2000, Barry Scheck and Peter Neufeld (who founded the Innocence Project at Cardozo School of Law in 1992), along with journalist Jim Dwyer, published *Actual Innocence*, which also used DNA exonerations as a fulcrum with which to explore the failings of the American criminal justice system. To be sure, most of the cases profiled in the book—more than two hundred postconviction DNA exonerations to date—were

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5. Described by the prosecutor as a “16-year-old virgin” at trial, the “victim” admitted many years after Dotson was freed that she had fabricated the crime because she feared that her boyfriend had made her pregnant through unprotected sex (Warden 2006).

not capital cases. Moreover, most of the post-Gregg death row exonerations were generated by means other than postconviction DNA testing. And yet, we suggest, the DNA-driven death row exonerations, though few in number, lend credibility to all the death row exonerations, even those generated by means other than DNA, by definitively shattering the air of inconceivability that previously had shrouded the idea of a post-Gregg wrongful capital conviction. Indeed, the salience of DNA exoneration for the issue of capital punishment was nicely indicated by the subtitle of the first edition of *Actual Innocence: Five Days to Execution and Other Dispatches from the Wrongly Convicted*.<sup>6</sup>

## DNA PROFILING

For those legal actors frustrated with the increasingly apparent failures of law as a truth-making enterprise, the idea that DNA profiling is inherently superior to other forms of evidence understandably has a lot of appeal. It allows commentators to say things like

we now have nearly irrefutable factual evidence that our past reliance on existing procedures to protect the innocent was misplaced. . . . One reason for this certainty that we convict innocents is DNA . . . that can, in some cases, be used by scientists to provide us with scientific answers to the question of guilt or innocence. (Rosen 2003, 68)

Or they can say that “newly probative DNA evidence offers the possibility of defendants who can demonstrate *with scientific certainty* that they are factually innocent of a crime to which they pleaded guilty” (Kreimer 2005, 660, emphasis added). “Science,” Zimring (2003) notes, could “provide critics of capital punishment with an opportunity to contradict official versions of capital crimes with more persuasive data than alibi witnesses or the reported confessions of others” (170). But from the perspective of STS, it is clear that such discourse reflects an idealized (or rather carefully fashioned) image of DNA profiling more than its actual practice.<sup>7</sup> A brief review of how DNA evidence is produced helps to make this point much more clear.

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6. The subtitle of the latest edition (2001) is “When Justice Goes Wrong and How to Make It Right,” which shifts the focus from the perspective of condemnation of the system to one of remedying its shortcomings (Scheck, Neufeld, and Dwyer 2000, 2001).

7. To understand science this way would be akin to the understanding of law before the law and society movement, that is, to take law’s expressed ideals at face value without inquiring into to what extent they are realized in practice.

We should note that in making this assertion, it is not necessary for us to arbitrate among the many competing philosophical views of the nature of scientific knowledge-making. (And, indeed, we do not necessarily share precisely the same view.) To say that the discourse described in this article represents an idealized notion of “science” is broadly compatible with virtually any contemporary view of science.

DNA profiling is based on the fundamental premise that, with the exception of identical twins, no two human beings have exactly the same genetic make-up.<sup>8</sup> There are various forms of difference—polymorphism—within the human genome. For example, any two individuals will have different nucleotides at about one in one thousand sites as a result of random mutation. There are also regions of the genome called tandem repeats, where short sequences of DNA are repeated one after the other. The number of repetitive sequences at certain locations in the genome can be highly variable from person to person. The DNA profiling method most commonly used today focuses on very short tandem repeats that are two to six nucleotides long and is called short tandem repeat (STR) analysis. STR analysis was developed in the early 1990s and largely replaced the slower, more laborious, and less sensitive restriction fragment length polymorphism (RFLP) analysis by the late 1990s (Aronson 2007).

The first step of the DNA profiling procedure is to extract DNA from the biological material, whether it is a semen stain from a rape case or a blood sample from a criminal suspect. Once isolated, the DNA is subjected to the polymerase chain reaction (PCR), which is an enzymatic process that replicates a specific region of the genome over and over and over. The process entails heating and cooling DNA at precise temperatures through about thirty cycles in the presence of various chemicals, enzymes, and molecules (see Butler 2005). It should be noted that although PCR has become standardized and routinized within the forensic context, subjective decisions must still be made about how to optimize the run conditions for the condition of evidence left at the crime scene (Jordan and Lynch 1998). Further, because of the extreme sensitivity of the technique, even a small amount of contamination has the potential to lead to false results (Butler 2005).

At the end of the reiterative PCR cycle, several hundred million copies of the regions of interest are produced from only a few original DNA molecules. The next step in the process is to analyze the results by measuring the size of the fragments produced from biological samples. Based on this information, which is recorded as a series of peaks on an electropherogram (which looks a bit like a Technicolor heart-rate monitor), a specialized computer program interprets this data. This computer program must distinguish between the numerous alleles of more than a dozen STR loci from data that is not always perfect. Numerous technical problems can lead to interpretation mishaps and occasional miscalls, most of which involve interpreting whether small peaks are true peaks or are spurious (Butler 2005). While these ambiguous peaks are relatively easy to resolve in single DNA

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8. Butler (2005) provides an excellent introduction to the science of DNA profiling for those who are unfamiliar with the technology.

contributor samples, they are much more troublesome in mixtures or degraded samples, both of which frequently occur in rape cases. In addition to these problems, there are a range of other issues that require human intervention in the interpretation process (Butler 2005; Thompson et al. 2003). At present, however, there are no generally accepted or nationally recognized standards for declaring a match between two profiles. As in other realms of DNA profiling and forensic science, there are only guidelines and recommendations.

Thus, DNA analysts at two different labs might make different decisions about whether a peak is a valid allele or a technical artifact, or whether an allelic dropout (i.e., loss of a peak) is caused by degraded DNA or represents nonmatching DNA profiles. Further, there is no strict standard for how many alleles can be missing from one profile for it to match another. This can distort the reported probative value of the evidence (because many different profiles might have been capable of “matching” the crime scene profile) (Thompson 2008). Moreover, it can lead to bias if the analyst uses the suspect profile as a guide to interpreting the ambiguous data found in the crime scene profile (Risinger et al. 2002; Krane et al. 2008).

### The Authority of “Science”

Despite these contingencies, DNA profiling is deployed in the innocence discourse as a rhetorical foil to legal decision-making processes that are flawed, imperfect, error-prone, subjective, and so on. Much of Scheck and Neufeld’s public writing and speaking have drawn on the trope of using DNA to pose a validity test not just for other forms of evidence but also for the criminal justice system itself. By treating DNA evidence as ground truth, past attempts by the criminal justice system to get at truth may be tested. The criminal justice system, Scheck and Neufeld argue, fails the test. And now, claims Scheck, DNA testing provides a “magic black box” that can be used to go back and look at cases of wrongful conviction to determine what went wrong (*Frontline* 1997). He states,

When you saw a case, depending whether you’re a judge, a prosecutor, a defense lawyer, anyone in the system, you see a case where somebody is convicted and they drag that individual out of the courtroom and he is screaming, “I’m innocent, I’m innocent,” and you walk away sometimes saying, “I don’t know, there’s some doubt.” Now we can go back to those cases 15, 20 years later and we can find out. (*Frontline* 1997)

Or, as Neufeld put it, “the reason we have had success where other efforts have failed is that DNA is a kind of gold standard of innocence, so people cannot dispute these cases” (quoted in Nowak 2003). Neufeld’s reference to

the gold standard invokes the classic idea of validity testing in which the value of something (in this case, the routine accuracy of American criminal justice) is *calibrated* against some known and well-accepted standard (in this case, DNA).

Liebman's (2002) effort to characterize the "reason why DNA exonerations have such a hold of the popular imagination" (543) draws on yet another trope, religion, to convey the way in which DNA functions as an irrefutable arbiter of truth and thus as a *test* of the law's version of truth.<sup>9</sup> DNA exonerations, he writes, "involve something like divine intervention—the inscrutable and unpredictable intercession by grace of a power to see an otherwise unknowable and undiscoverable truth, that truth being the inherent fallibility and corruption of humans and their institutions" (543). Liebman further points out that DNA exonerations play a particularly important role in undermining the law's epistemic authority because, unlike non-DNA exonerations, which are typically exposed by some aspect of "the [legal or criminal justice] system," one must conclude that most DNA exonerations would never have come to light *were it not for the fortuitous development of technology at that particular historical moment* (not to mention the fortuitous preservation of the biological evidence in that particular case). Similarly, Garrett (2008) has shown that, for almost all of the postconviction DNA exonerations, innocence arguments were rejected, or not even put forward, before the appearance of the DNA evidence. Without DNA, innocence was indiscernible. This is an important finding because it demonstrates that normal legal mechanisms were incapable of detecting innocence in these (now indisputable) innocence cases. Thus, for DNA exonerations, it is more difficult to argue that "the system worked," and, in capital cases, it is more difficult to argue that the system would have stopped the execution *had DNA evidence not been developed* (Liebman 2002, 545–47). "It is this sense of insecurity in the face of an only infrequently and arbitrarily—but, when it occurs, infallibly—revealed truth about . . . our institutions' weaknesses that DNA most forcibly instills, and that, in turn, most powerfully motivates our national doubts about the current application of the death penalty" (547).<sup>10</sup>

Law, like science, is a truth-producing social institution, but it does not carry the same epistemic authority as science within Anglo-American society (Loevinger 1967; Huber 1991; Goldberg 1994; Jasanoff 1995; Angell 1996;

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9. Of course, science and religion are not nearly as unrelated as the contemporary popular imagination would have them (Fuller 2006).

10. Rosen (2003) sees a plausible legal argument in the evidence of innocence amassed by exonerations: he argues that *Gregg* approved the constitutionality of the death penalty only "in the absence of more convincing evidence" and that "now such evidence exists—powerful evidence of innocents on death row" (106). With the overturning of *Quinones* (2002b) and the current makeup of the courts, such legal arguments are probably academic.

Bourdieu 1998). Society relies on law to determine truth about many important matters, but our reliance is based on a belief that law has the pragmatic ability to resolve questions (reasonably) efficiently and, above all, fairly in circumstances of messy contingency (Jasanoff 1995). The preference for law is in part methodological: usually, the circumstances in which law serves as arbiter of truth are circumstances in which the methods of science, however epistemically privileged, would be unusable.

As a system, designed in part around the need for efficient and expeditious resolution of disputes, rather than a search for “ultimate truth,” law has developed a variety of principles designed to bring the process of inquiry to an end even in the face of uncertainty. These principles are generally summed up under the rubric of “finality” (Berger 2000, 2). Finality essentially means that at various points in the process of inquiry (verdict, resolution of direct appeal, etc.), law becomes increasingly (and, from an epistemological point of view, unreasonably) attached to the version of the truth to which it has committed itself. Indeed, our criminal justice system does not possess a method for reviewing factual mistakes unless there is a procedural error that accompanies it. Legally speaking, “truth” is largely irrelevant in postconviction litigation (Rosen 2003, 75).<sup>11</sup>

The use of the authority of science in the death penalty debate has the potential to cause society to question law’s epistemic claims as a truth-generating institution. Moreover, the law’s historic opposition to even *consider* its own accuracy may come under sustained pressure from the injection of DNA evidence into the death penalty debate. Innocence activists frequently make invidious comparisons between the response to errors in, say, transportation or medicine and the response in law (Scheck and Neufeld 2002). Law, they point out, has no mechanisms to undertake investigations of its own errors or assessments of its own accuracy. Indeed, legal principles such as finality render such undertakings suspect. Innocence activists have managed to use this attitude to portray the law as a defiantly premodern institution.

Such arguments invoke the language of system failure against the criminal justice system. The Innocence Project has always sought to do more than merely exonerate individuals; it has tried valiantly to use exonerations as “windows” into the workings and failings of the criminal justice system.<sup>12</sup> It

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11. Indeed, criminal law places extraordinary limits on the ability of facts to dislodge the established version of truth. This is true even in the case of DNA evidence; a great deal of the work of postconviction DNA exoneration consists of overcoming *procedural* obstacles to having the evidence tested or testing results considered by a court. In most cases, innocence claimants have little or no legal right to have DNA evidence tested or testing results considered by a court; typically, they must rely on discretionary decisions by judges to allow testing and hearing of evidence to go forward (Kreimer and Rudovsky 2002). That innocence claimants usually eventually succeed in these efforts (Dewan 2004) is itself testament to the persuasive authority of DNA evidence.

12. For more on the Innocence Project, see <http://www.innocenceproject.org/about> (accessed February 5, 2009).

has consistently tried to resist the media's inexorable tendency to turn exonerations into heartwarming individual stories of tragedy and triumph. Instead, it relentlessly focuses attention on the *systemic* failings revealed by exonerations and to the inevitable conclusion that each *known* exoneration must represent many more wrongly convicted whose innocence simply cannot be demonstrated. To shift media, public, or even political attention in this way is far from an easy task, and how successful the Innocence Project has been is open to debate. For our purposes here, it is sufficient to note that, again, the epistemic authority of science is crucial to the task. Only with the tendency to quibble over the factual innocence of the exonerated neutralized is it possible to proceed to discussion of systemic reform.

Perhaps one of the most powerful such invocations is that of former Illinois Governor George Ryan, who drew on his own occupational identity as a practitioner of that most quotidian of sciences, pharmacy. Notably, even if pharmacists are not "high" scientists, they are quite concerned with quality control and sensitive to the problem of undiscovered errors concealed within routine practice. Thus, Ryan declared himself perplexed by the law's seeming indifference to catastrophic errors, something that would be met with aggressive remedial measures if it had occurred within pharmaceutical practice. The system failure argument also plays into another abolitionist argument. It is one thing to tolerate a certain level of routine errors in exchange for the benefits of transportation or the delivery of medicines that alleviate suffering. But why tolerate errors in a system that, abolitionists claim, we can do without (Zimring 2005, 122)?

Another way in which the epistemic authority of science is invoked is by pointing to DNA evidence's purported ability to overturn "commonsensical" intuitions and stereotypes. In an interview with *New Scientist* magazine, Neufeld stated,

In about 50 per cent of all the cases we take to the laboratory, the DNA exonerates them. In about 50 per cent of the cases the DNA confirms guilt. We had two guys a few years ago who went to the laboratory the same week. One fellow was the most pleasant, lovely, supportive, young man. Sent Mother's Day cards to the students, talked about how he couldn't wait to get back to his ailing grandmother, could not have been nicer. And the other fella was a real nasty son of a bitch, cursed out the students, was furious with everybody, talked about crimes he would commit if he could only get out. The students were convinced that the first person would be excluded by the DNA and the second person implicated. Just the opposite occurred. The beauty of the science is that it topples the common intuitions that we rely on to make important decisions. (quoted in Nowak 2003)

## Epistemological Closure

DNA evidence appears to be able to provide what we might call *epistemological closure* of disputed postconviction exonerations.<sup>13</sup> Importantly for our purposes, “closure” does not entail complete proof of any particular position. Rather, it refers to the point at which almost all of the relevant stakeholders agree not to debate the point any longer. Unlike the alleged wrongful convictions debated by Bedau and Radelet (1987) and Markman and Cassell (1988), the Dotson case was successfully brought to the point of epistemological closure. In other words, in the Dotson case the relevant stakeholders, which in legal discourse Edmond (2002b) has called the “law set,” agreed on the version of truth provided by DNA evidence. It is not that the DNA evidence could not be disputed. Unlikely but possible theories of the crime that accommodate the DNA evidence could be devised (e.g., the notorious “unindicted co-ejaculator” theory<sup>14</sup>), the implication of laboratory contamination or sample mix-up could be raised, or the “black box” of DNA evidence itself could be opened up and contested (Halfon 1998; Jordan and Lynch 1998). But, in an environment of scarce epistemological resources, the costs of disbelieving DNA evidence are too high. As Zimring (2003) observes, “DNA exonerations end the debate about whether a reversal or nonprosecution is really an exoneration. A broad public opinion accepts DNA findings as definitive, so there is no tactical advantage to prosecutors denying definitive DNA results as establishing innocence” (159).

The decreasing tenability of arguments against DNA exonerations is well illustrated by the press reports of the Bruce Godschalk case in Montgomery County, Pennsylvania, in 2002.<sup>15</sup> Even after the court ordered Godschalk released, District Attorney Bruce Castor declared the “DNA testing is flawed” and that Godschalk was guilty. The slender cultural plausibility of such a statement is aptly conveyed by the ironic tone of the *New York Times*’s report of the statement: “Asked what scientific basis he had for concluding the testing was flawed, Mr. Castor said in an interview today: ‘I have no scientific basis. I know because I trust my detective and my tape-recorded confession. Therefore, the results must be flawed until someone proves to me otherwise’” (Rimer 2002). In addition to the *New York Times*’s implicit criticism, Castor’s view was explicitly mocked in editorials around the country (Tucker 2002). These characterizations illustrate the cultural implausibility of Castor’s radically skeptical assertion that “DNA testing is flawed” because it contradicts the conclusions of a detective and a confession.

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13. This framing draws on Collins’s (1981) notion of “closure” in scientific controversies.

14. In this scenario, prosecutors argue that the convict was involved in the crime with another unknown assailant, and that only the unknown assailant’s biological material was recovered from the crime scene.

15. For a review of Godschalk’s case, see <http://www.innocenceproject.org/Content/154.php> (accessed February 5, 2009).



Such prosecutorial and judicial expressions of skepticism about DNA evidence are becoming increasingly rare. Even if doubt is expressed about some individual DNA exonerations, with over two hundred postconviction DNA exonerations recorded, innocence activists can invoke numbers. At the time of this writing, the vast majority of criminal justice system actors appear to have conceded the broader point: DNA exonerations are largely factual innocence cases. In short, DNA exonerations appear to be armed with a resistance to the sort of radically skeptical moves that for so long neutralized exonerations from having any power to undermine faith in capital punishment (or criminal justice more generally).

### A DOUBLE-EDGED SWORD

As scholars who specialize in the social study of science, we will admit to some discomfort with the rhetorical employment of science in the discourse reported above. Before turning to our own analysis, however, we will first discuss some of the misgivings that the actors themselves have expressed about their own deployment of DNA profiling in the death penalty debate. Even amidst the heady euphoria of having hit upon an issue that provides some hope of breaking the long deadlocked capital punishment debate, some abolitionists perceive moral and strategic hazards posed by embrace of the innocence argument.

Many abolitionists, for instance, worry that an overemphasis on innocence can distract attention from other good reasons to oppose capital punishment, as well as other important problems with our criminal justice system (such as overpunishment and racism) (Davis 2003; Berman 2006). Similarly, the tactical call for moratoria based on revelations of innocence may potentially backfire by allowing death penalty proponents to claim that the system has been “repaired” (Bedau 2004b, 26). Zimring (2003) has also noted that in the courts, greater attention to innocence has coexisted with strenuous—and contradictory—efforts, such as the Anti-Terrorism and Effective Death Penalty Act of 1996, “to remove the obstacles to executions by strict enforcement of procedural defaults” (174). Sarat (2003) perhaps summed it up best when he characterized some abolitionists’ embrace of innocence as at once morally indefensible *and* morally necessary.

Further, it would be difficult to dispute that in some ways the innocence movement has provided useful cover and an image of political neutrality for the increasing use of DNA technology in forensic investigations. It has allowed the insertion of the humane phrase “and protect the innocent” to the resonant tough-on-crime phrase “convict the guilty” in justifications for the expansion of DNA testing, thus creating an unbeatable rhetorical justification for the expansion of DNA technology. Moreover, DNA exonerations did not merely facilitate the expanded use of investigative DNA technology, they

also strengthened its epistemic authority. Indeed, this is surely one reason that DNA exonerations achieve the epistemological closure described above. It might be imagined that even those criminal justice system actors who were least pleased to see exonerations—prosecutors and judges—saw the concession of even two hundred exonerations as a small price to pay for solidifying the mantle of truth and certainty around the *inculpatory* uses of DNA evidence—especially if Scheck and Neufeld’s more general critique of the criminal justice system could be neutralized. Inculpatory uses of DNA evidence are indeed becoming increasingly difficult to challenge, and courts are coming under increasing pressure to essentially anoint all DNA evidence as truthful and discourage inquiries into potential problems with the evidence (Aronson 2007; Lynch et al. 2008).

In the death penalty discourse as well, DNA has been turned on its head. The authority and credibility of DNA have been used not just to undermine faith in the criminal justice but also to bolster it. As Senator Orrin Hatch stated in a 2001 congressional hearing on postconviction testing, “It is indisputable that advanced DNA testing lends support and credibility to the accuracy and integrity of capital verdicts. In short, we are in a better position than ever before to ensure that only the guilty are executed” (Hatch 2000). Similarly, Justice Scalia, in response to Justice Souter’s treatment of DNA exonerations as evidence of the unreliability of capital punishment, not only treats exonerations as “a vindication of [the capital justice system’s] effectiveness,” but also touts DNA as a “scientific means of establishing guilt” (*Kansas v. Marsh* 2006, 2534–36, Scalia, J., concurring). Similarly, in recent hearings held by the Maryland Commission on Capital Punishment, Scheck was forced to rebut claims that “advances in DNA testing in recent years significantly diminish the chance of wrongful conviction in capital cases” and that “with today’s forensic science, it is unlikely that an innocent man could be executed” (quoted in Bykowitz 2008).

Such a turn of events was in a sense a predictable outcome of the ways in which DNA-based claims of innocence have been deployed in the death penalty debate. Indeed, in retrospect, it is possible to discern the seeds of this development even in the innocence argument’s finest hour, Judge Rakoff’s decision in *Quinones* (2002b). In one breath, Rakoff argued that exonerations vouched for with the authority of DNA provided the proof that was lacking in *Herrera v. Collins* (1993) that innocent people can be convicted of capital crimes, and possibly executed. “We now know,” Rakoff wrote, “in a way almost unthinkable even a decade ago, that our system of criminal justice, for all its protections, is sufficiently fallible that innocent people are convicted of capital crimes with some frequency” (*United States v. Quinones* 2002b, 420). Postconviction DNA exonerations tell us that errors occur in our death penalty system, thus rendering it, for Rakoff, unconstitutional. But in the next breath, Rakoff anticipates the invoking of the authority of DNA in favor of the argument that the “broken system” (Liebman, Fagan, and West 2000)

is now fixed. “Fortunately, as DNA testing illustrates, scientific developments and other innovative measures (including some not yet even known) may enable us not only to *prevent future mistakes* but also to rectify past ones by releasing wrongfully-convicted persons—but only if such persons are still alive to be released” (*United States v. Quinones* 2002b, 420, emphasis added).

Rakoff’s argument focused not merely on the epistemic certainty of the exonerees’ innocence claims, but also on their temporal nature: “that . . . convincing proof of their innocence often does not emerge until long after their convictions,” thus inviting risk of wrongful execution (*United States v. Quinones* 2002a, 257). The question is whether Rakoff’s view of the danger of wrongful execution can survive the period in which *preconviction* DNA typing becomes routine. We might still infer from the era of postconviction DNA testing that we probably execute the innocent, but we would no longer have any proof that we do, lacking a “truth machine” to overturn settled convictions with the finality of DNA evidence. Thus, the reliance on DNA as the authority that vouches for the claim that we execute the innocent renders some abolitionists vulnerable to the argument—whatever its merits—that DNA fixes capital punishment. As Mandery (2004) puts it, abolitionists “succumbed to the lure of innocence. . . . But now they’ve been called on it” (519).

Mandery was referring to the so-called guilty project. On September 23, 2003, Governor Mitt Romney’s office issued a press release announcing his plans to reinstate the death penalty in Massachusetts, one of only twelve states at the time without capital punishment. Titled “Romney Takes Scientific Approach to Death Penalty,” the press release stated that Romney hoped to rely on “the latest advances in forensic science” to ensure that the death penalty would be “narrowly applied and used in accordance with the highest standard of proof” (Massachusetts Governor’s Office 2003).

The reason he turned to science was clear to friend and foe alike. As James P. Rooney, a Massachusetts anti-death penalty advocate explained:

The nagging question of innocence also brought a new moral calculus to the old death penalty debate, one expressed in Massachusetts by recently retired House Speaker Thomas Finneran. A one-time death penalty supporter, this conservative Democrat now believes that, in taking the life of a wrongfully convicted person, society would be killing a person as innocent as the murder victim whose death had occasioned society’s revenge. This philosophy can brook no error. *The only human construct that offers the hope of such certainty is science* (at least in the opinion of non-scientists), so it is to science that Governor Romney turned. (Rooney, emphasis added)

In order to achieve the goal of what the press quickly labeled as a “foolproof” death penalty, Romney commissioned a panel of leading scientific

and legal experts to come up with a plan that would ensure that only the guilty were executed and only for a very narrow set of crimes. Their charge was twofold: first, to create a narrowly defined subset of first degree murders that would trigger the death penalty, so as to ensure that only the “worst of the worst” were executed, and, second, to place a “strong emphasis on the use of scientific evidence to help establish the defendant’s guilt, which will ensure—as much as humanly possible—that no innocent person will ever wrongly be condemned to death” (Governor’s Council Final Report 2004, 4). In a sense, Massachusetts sought to achieve through science the *Furman*-dictated goals of reliability and narrow tailoring that other states had sought to achieve through legal procedures.

As one member noted shortly after the panel issued its final report, the debate about the death penalty over the past several years had been dominated by two polar opposite approaches: the path of the status quo versus complete abolition (Hoffman 2005). He argued that Romney and the council had decided to embark down a different, reformist path: “pursuit of the Holy Grail of a death penalty that can meet society’s standards for accuracy and fairness” (565).<sup>16</sup>

In their final report, the Governor’s Council on Capital Punishment offered a series of ten proposals (including statutory, procedural, legal, and technical recommendations) that “if adopted in their entirety, can allow creation of a fair capital punishment statute for Massachusetts that is as narrowly tailored, and as infallible, as humanly possible” (Governor’s Council Final Report 2004, 3). Throughout the report, the council made it clear that the recommendations would only be effective if they were adopted as a whole, and that the best way to ensure accuracy was through multiple layers of review, including a rigorous review of scientific evidence in capital cases (4).

The sixth proposal—the need for “conclusive scientific evidence (i.e., physical or other associative evidence), reaching a high level of scientific certainty, that connects the defendant to either the location of the crime scene, the murder weapon, or the victim’s body, and that strongly corroborates the defendant’s guilt of capital murder” (20) in order for a death sentence to be imposed—is particularly interesting in this context. The council stated that

while the current benchmark for the kind of “physical or other associative evidence” that can satisfy this recommendation is a full single-source DNA profile, other categories of “physical or other associative evidence” may be capable of providing conclusive associations of suspects, victims, crime scenes, and/or the implements of crime. These

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16. It might be argued that New York State took this third path in its reinstatement of capital punishment during the 1990s.

include photographs, video- and audiotapes, fingerprints, and certain impression evidence (e.g., some footwear impressions, tire impressions, tool marks, firearms-related impressions, and other physical pattern matches). (20)

Perhaps the most obvious flaw in this proposal is the ironic fact that, if considered as a broad, undifferentiated category of evidence, “science” itself (in the form of forensic techniques that, according to some critics, have never been subjected to validation studies and have high rates of error) is the second leading cause of wrongful conviction among postconviction DNA exonerations (Saks and Koehler 2005; Garrett 2008). In other words, purportedly unassailable science (DNA) today tells us that one of the chief causes of wrongful convictions was scientific evidence that was touted as unassailable at the time of the conviction. This alone would seem to suggest that the lesson to take from the learning opportunity afforded by postconviction DNA testing is not so much a need for better technology, but a need for continuous skepticism concerning whatever technology is currently touted as the “latest.” Indeed, despite claims of infallibility of the technique, DNA profiling errors have been discovered with surprising regularity over the past decade (Thompson 2006; Aronson 2007).

Moreover, the Massachusetts proposal uses “science” as a monolithic category to describe a wide range of forms of evidence. The proposal is conspicuously vague in its description of science, and, as it stands, the proposal would count as “science” everything ranging from DNA profiling to handwriting identification to microscopic hair analysis to footwear comparison. Indeed, the proposal’s notion of science is so unspecified that it is not clear whether it would actually narrow the set of cases subject to the death penalty very much, if at all.<sup>17</sup>

An obvious problem with this notion of “science” is that the urge behind the sixth proposal (the requirement of “scientific evidence to corroborate the defendant’s guilt”), which clearly was the urge to have a DNA-based death penalty, has ended up, through this vague wording, dragging in all sorts of other forms of evidence calling themselves “science” that may be of questionable reliability. The accuracy of most of the techniques that would fall into the proposal’s broad category of science is simply unknown. An example is fingerprint evidence, which certainly would qualify under the Massachusetts guidelines (Pokorak 2005; Cole 2006). Other techniques, such as handwriting identification, microscopic hair comparison, and bite mark analysis, are known to have high rates of inaccuracy.

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17. On the other hand, it has been suggested that other aspects of the Massachusetts proposal might narrow the set of cases to null. It has also been noted that the proposal might raise arbitrariness issues, in that the death penalty might be applied, not according to the ratio of aggravation to mitigation as currently required by the Supreme Court, but according to availability of evidence (Pokorak 2005).

It is true that the report notes that “not all ‘physical or associative evidence’ will be capable of satisfying this requirement of conclusive evidence reaching the level of scientific certainty that adequately connects the defendant to the crime” (Governor’s Council Final Report 2004, 20). But the main thrust of the critiques of many types of associative evidence is precisely that practitioners routinely overclaim the scientific certainty of their own conclusions (Friedman 2003; Cole 2007). Moreover, the Massachusetts proposal would increase the incentive for such overclaiming. Rather than acknowledging scientific evidence as inherently uncertain and pushing it toward its strength, which is its potential ability to quantify and transparently convey uncertainty, the Massachusetts proposal pushes forensic witnesses toward greater claims of certainty.

The council’s recommendation, however, went well beyond the mere existence of sound scientific evidence of guilt. They also argued that it was crucial to review that evidence to ensure that it was collected, handled, preserved, analyzed, stored, and interpreted according to the “highest standards of the medical and scientific community” (Governor’s Council Final Report 2004, 24). In order to fulfill this function, the council recommended the creation of an Independent Scientific Review (ISR) Panel. In addition to reviewing the actual evidence in the particular capital case, the ISR Panel would also be charged with ensuring that all crime laboratories and other forensic science providers in the case were properly accredited by an appropriate accrediting organization (24). This measure, they hoped, would “provide strong incentives for systematic reforms across the forensic science community” (25). Although the council did not state explicitly what would happen if such a review turned up major problems, it seems that they would bar this evidence from being used during the sentencing phase of the trial.

On April 28, 2005, Mitt Romney filed his death penalty bill in the Massachusetts House, which was based almost entirely on the final report of the Governor’s Council. In announcing the bill in his press release, titled “Relying on Science, Romney Files Death Penalty Bill,” Governor Romney was quoted as saying that previous efforts to reintroduce the death penalty in the state failed because “of concerns that it would be too broadly applied or that evidentiary standards weren’t high enough or proper safeguards weren’t in place” (Massachusetts Governor’s Office 2005).

In editorials lambasting the governor and the council’s final report, however, abolitionists found numerous reasons to reject capital punishment, only some of which had to do with accuracy. In an editorial in the *Bergen County Record*, University of Houston law professor David R. Dow (2003) called Romney’s plan “stunningly naïve.” He argued that creating an infallible death penalty system was like trying to develop risk-free space travel, perfect mail delivery, or a national highway system with zero fatalities. At a deeper level, though, Dow saw the execution of innocents as only one part of the problem with the death penalty. Issues such as racial inequities in

sentencing are just as pernicious and were not going to be addressed at all by the council. This meant that any death penalty statute that came out of its deliberations would still be fundamentally unjust.

In an editorial in the *Boston Globe* titled "Foolproof or Foolish?", James Alan Fox (2003), a professor of criminal justice at Northeastern University, noted that Romney hoped to exploit the power of DNA evidence and other forms of science to produce an infallible death penalty that could serve as a model for the rest of the nation. Despite the great power of DNA that citizens read about in the newspaper and see on CSI, however, Fox noted that the human beings who perform the test do indeed make mistakes (see below).

Romney's proposal was resoundingly voted down by a margin of 100-53 in November 2005 (Helman 2005). Skepticism that a "system that relies on scientific evidence" would operate "flawlessly" was among the reasons for the bill's defeat (Jasanoff 2006, 332). The significance of this vote is put into perspective when one realizes that preliminary versions of a bill to reinstate the death penalty passed both the Massachusetts House and Senate and lost by just one vote in the final House vote in 1997 (Walker and Wong 1997).

Although the Massachusetts proposal is the clearest example, there are other instances of the ways in which some abolitionists' deployment of innocence may be seen to have had "bite back" effects (Tenner 1996). Following Massachusetts, another abolitionist state, Wisconsin, recently introduced a nonbinding ballot measure asking whether the death penalty should be reinstated "if the conviction is supported by DNA evidence." The sponsor of the initiative said that he included the DNA clause "to defang opponents. 'It was my hope that this would dispel some of the fence-sitters from saying that the sky is falling and that someone is going to be wrongly convicted'" (Erickson 2006). So, just as some abolitionists hoped that ironclad innocence, vouched for by DNA, would sway the "center" in the death penalty debate, proponents of capital punishment are now hoping that ironclad guilt will sway the center the other way.

## DEATH IS DIFFERENT, BUT IS DNA?

The tendency, discussed above, to characterize DNA as a "truth machine," fueled in part by the use of DNA to undermine trust in the death penalty itself, obscures the fact that DNA evidence is evidence, too, and therefore subject to error, misinterpretation, and uncertainty. Recent problems in DNA laboratories around the country suggest that we should not be so fast to assume the sanctity of DNA evidence. While some mistakes have been the result of simple clerical errors, others have revealed overt fraud and inexcusable incompetence on a grand scale. The most well-known of these cases is the Houston Police Department's (HPD) Crime Laboratory, which was closed down in 2002 after it was discovered that employees regularly

fabricated DNA and other forensic evidence in their labs and lied in court about the results of their test. An ongoing investigation of the HPD casework has revealed forty-three DNA cases “in which there are significant doubts about reliability of the work performed, the validity of the Crime Lab’s analytical results, or the correctness of the analysts’ reported conclusions” (Office of the Independent Investigator for the Houston Police Department Crime Laboratory and Property Room 2006).

While the Houston story is no doubt the most dramatic, other laboratories have not been immune from embarrassment, including the FBI, where an analyst had been faking the quality control portion of her work for more than two years (US Department of Justice 2004). Related problems have been discovered in Seattle’s crime laboratory, where DNA contamination and other errors were found in at least twenty-three cases (*Seattle Post-Intelligencer* 2004). In North Carolina, the state Bureau of Investigations DNA unit has recently come under fire in an exposé by the *Winston-Salem Journal* (Zerwick 2005). Although an audit by the American Society of Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) cleared the laboratory of wrong-doing in the particular case in question, the organization urged the state to improve the way it collected, handled, and stored biological evidence (Zerwick 2005). Cross-contamination and sample mislabeling problems have also been documented in Pennsylvania, Nevada, California (Thompson 2006), and elsewhere (Ruethling 2005; Cadiz 2004; McGlone 2006).

Postconviction testing has not been immune from similar mistakes. In a highly publicized Virginia case, investigations associated with the postconviction exoneration of death-row inmate Earl Washington, Jr., led to the discovery that the State Division of Forensic Sciences Central Laboratory in Richmond, which long held a reputation as one of the nation’s finest, had made numerous mistakes in the course of their 2000 review of Washington’s 1983 conviction for rape and murder. According to an ASCLD/LAB audit, the Virginia state laboratory had not followed accepted procedures when conducting PCR-based DNA profiling; misinterpreted the results of the test, leading to erroneous exclusion of the victim from the vaginal smear taken from her dead body; and made numerous conclusions that were unsupported by available data (ASCLD/LAB 2005). The report also concluded that the laboratory’s own mechanisms for catching errors failed in this case since the technical reviewer did not observe the errors in the processes and the reported results (17).

It is, of course, hardly surprising that fraud and incompetence would occur in forensic DNA testing, as would be expected for any technical practice. However, even competently and honestly performed DNA analyses may not always function as the archetypal “truth machine.” DNA “matches” may represent many things in addition to evidence that the matched individual committed the crime in question. The match may be “coincidental”—the suspect may share the same alleles as the true perpetrator at some number



of loci. The possibility of a coincidental match is, of course, significantly higher for a “partial” (fewer than thirteen loci) match, and several such coincidental matches for partial profiles have occurred (Mnookin 2001; Murphy 2007). However, even at the thirteen loci used by the FBI’s CODIS<sup>18</sup> system, some coincidental matches are likely in populations the size of countries like the United States and United Kingdom, though none have yet been found (Weir 2007; Thompson 2008). The likelihood of coincidental match is greater if a close blood relative is the true perpetrator.

In addition, the DNA match may have been left innocently at a time other than the occurrence of the crime or through third-party transfer. Or the DNA may have been maliciously planted, something that is becoming increasingly possible (Dent 2006; Thompson 2008). Even setting those possibilities aside, in many cases, DNA evidence can be subject to conflicting interpretations. Cases involving partial profiles, mixtures of several different DNA profiles, or low copy number DNA (profiles produced from very small amounts of DNA) are particularly vulnerable to what sociologists of science call “interpretive flexibility” (Pinch and Bijker 1984), in which the evidence may be consistent with more than one version of “the facts.” In cases involving mixtures, for example, the “truth” told by DNA evidence can depend on assumptions about how many contributors there are to a mixture and who they are. In such cases, far from functioning as a “truth machine,” DNA analysis requires making judgment calls about whether ambiguous results should be treated as true representations of genetic material or as artifacts (Thompson et al. 2003; Lynch et al. 2008).

The tendency among defenders of forensic science is to attribute such problems to pathologies—either pathological individuals or pathological practices—while preserving a zone of purity for the technique itself. This allows such defenders to claim that “the significance of forensic evidence, when performed properly and interpreted reasonably, is beyond dispute” (Bieber 2005, 71). Such pronouncements benefit from hindsight that is unavailable to the finders of fact in capital—or criminal—trials. Often the conclusion that a forensic assay was “performed properly and interpreted reasonably” is based on nothing more than whether one agrees with the results. For example, latent print misidentifications that were presumed to have been performed properly and interpreted reasonably at the time of trial, when exposed as misidentifications, are then deemed to have been performed incompetently (Cole 2005).<sup>19</sup> Whether the forensic tests were performed and interpreted properly or improperly is precisely what is unknown to the fact finder, and this is precisely what makes the jury verdict an exercise in decision making under conditions of uncertainty.

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18. CODIS is the acronym for Combined DNA Index System.

19. If competent performance is intended to serve as an indicator of accuracy of result, then there must be a measure of competence that is independent of the result.

## CONCLUSION

In contemporary death penalty discourse, some abolitionists have used DNA evidence as an epistemological lever with which to undermine trust in the American criminal justice system. This rhetorical strategy invited death penalty reformers to similarly portray science as a truth-producer with epistemic authority sufficient to enable the American public to accept the deliberate taking of the lives of fellow citizens without worry. Such arguments have tended to treat science as an epistemic system fundamentally different from—and superior to—law. In such treatments, abolitionists and reformers alike seem to share a notion that DNA offers an escape from the fundamental uncertainties that necessarily undergird any system of criminal justice or state killing. The claim that science is certain and law is uncertain is a common one in both law and the popular imagination. Many existing legal practices stem from this idea. For example, the “beyond a reasonable doubt” standard derives from the seventeenth-century argument that law could generate “moral certainty” (i.e., a level of certainty that would allow the fair conduct of human affairs), but not the higher level of “mathematical certainty” achievable of science (Shapiro 1991, 7–8).

This notion, however, relies on an idealized image of science as certain, objective, and epistemically indisputable that is not shared among most practicing philosophers of science or even scientists themselves. The nature of science is now described in terms of probability (see Gigerenzer et al. 1989; Kruger, Daston, and Heidelberger 1990). In other words, the strength of science is now thought to lie in its ability to grasp, control, and, in some cases, quantify uncertainty, and to continuously strive to reduce it through systematic investigations into nature. The ability to deal with uncertainty, albeit without the opportunity to regularly revisit decisions, is what law does as well. Although the legal fact finder (either the judge or the jury) can never know for sure that they have the story (and the verdict) correct, they must get as close to the right decision as possible.

DNA does not and cannot answer questions of guilt or innocence with epistemological certainty. As Edmond (2002a) has demonstrated, the notion that science produces epistemically certain facts about criminal cases can only be sustained by evaluating the quality of scientific evidence based on one’s *a priori* conclusions about guilt or innocence. The widespread agreement that a particular conviction was “wrongful” or “just” is, in fact, a product of social consensus, not something dictated by the scientific evidence. In the case of the DNA exonerations, they are “ironclad” because the cultural authority of DNA renders the costs of doubting them too high, not because they are, in any fundamental sense, epistemically unchallengeable. Scientific

evidence is, at bottom, evidence, like any other. It is and should be, as Jasanoff (2006) puts it in a double entendre, "just evidence."

Arguments that rely on purportedly ironclad science elide the fundamentally probabilistic nature of scientific knowledge. The value of DNA evidence lies not in the fact that it escapes probability, but in the fact that, in contrast to much evidence, it makes possible calculations of probability based on actual data (however imperfect it may be). Interestingly, probabilistic thinking has been gaining ground in law recently, though there are still many areas of legal discourse, like the death penalty, that almost completely avoid it. Indeed, in its effort to avoid such probabilistic approaches, law turns to ostensibly certain science. But there will be no escape from uncertainty, in science or in capital punishment. DNA profiling offers no easy escape from the epistemological ties that bind capital punishment.

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