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## Nurturing Forensic Science: How Appropriate Funding and Government Oversight Can Further Strengthen the Forensic Science Community

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# NURTURING FORENSIC SCIENCE: HOW APPROPRIATE FUNDING AND GOVERNMENT OVERSIGHT CAN FURTHER STRENGTHEN THE FORENSIC SCIENCE COMMUNITY

*By Craig M. Cooley†*

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## I. INTRODUCTION

Tremendous scrutiny has been directed at the forensic science community recently. While the impetus for this scrutiny is multifaceted, the majority of the blame can be placed on two situations: (1) the numerous crime laboratory problems and scandals, and (2) the DNA exonerations involving unvalidated forensic technology, forensic evidence improperly used beyond its scientific parameters, or exaggerated testimony from a forensic analyst.

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In regard to crime laboratories, significant evidence has surfaced over the last decade indicating that public crime laboratories are *not* the sanctuaries of science we believed them to be, and that they are inadequately funded, staffed, and regulated. These factors significantly increase the likelihood that shortcuts will occur and limited research will be conducted. Shortcuts contribute to scandals and evidence handling issues, while a limited body of research contributes to exaggerated claims of validity, reliability, and infallibility. Indeed, the premier public crime laboratory in the country—the FBI laboratory—has had a series of embarrassing incidents, leading to the issuance of Inspector General Reports that were critical of the explosives unit in 1997, the DNA unit in 2004, and the fingerprint unit in 2006.<sup>1</sup> Similarly, Texans are quite familiar with the problems associated with the Houston Police Department Crime Laboratory.<sup>2</sup> An initial audit and a second, more comprehensive, audit of the laboratory identified countless problems and unscientific practices—some of which played a role in convicting the innocent.<sup>3</sup> Crime laboratory problems have also surfaced in several other cities, including Forth Worth.<sup>4</sup>

To date, there have been 272 DNA exonerations, as well as countless non-DNA exonerations.<sup>5</sup> Of the first 200 DNA exonerations, unvalidated or improper forensic science testimony played a role in nearly 60% of the cases.<sup>6</sup> Of the first 225 DNA exonerations, over 50% (116) involved unvalidated or improper forensic science testimony.<sup>7</sup> A few wrongful convictions even involved DNA evidence—or what many believe to be the gold standard of forensic science.<sup>8</sup> More-

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1. See OFFICE OF THE INSPECTOR GEN., U.S. DEP'T OF JUSTICE, THE FBI DNA LABORATORY: A REVIEW OF PROTOCOL AND PRACTICE VULNERABILITIES i–iii (2004), <http://www.justice.gov/oig/special/0405/final.pdf>; OFFICE OF THE INSPECTOR GEN., U.S. DEP'T OF JUSTICE, THE FBI LABORATORY: AN INVESTIGATION INTO LABORATORY PRACTICES AND ALLEGED MISCONDUCT IN EXPLOSIVES-RELATED AND OTHER CASES (1997), <http://www.fas.org/irp/agency/doj/oig/fbilab1/00exesum.htm>.

2. See OFFICE OF THE INSPECTOR GEN., U.S. DEP'T OF JUSTICE, A REVIEW OF THE FBI'S HANDLING OF THE BRANDON MAYFIELD CASE 1–4 (2006), <http://www.justice.gov/oig/special/s0601/exec.pdf>. The FBI also issued its own internal report. See Robert B. Stacey, *A Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case*, 54 J. FORENSIC IDENTIFICATION 707 (2004).

3. All audit reports are located at OFFICE OF THE INDEP. INVESTIGATOR FOR THE HOUS. POLICE DEP'T CRIME LAB. AND PROP. ROOM, <http://www.hpdlabinvestigation.org> (last visited Jan. 29, 2011).

4. See Denna Boyd, *Lab Inquiry Finds Flaws but No Injustices*, FORT WORTH STAR-TELEGRAM, Nov. 27, 2005, <http://truthinjustice.org/lab-tarrant.htm>.

5. See THE INNOCENCE PROJECT, <http://www.innocenceproject.org> (last visited Jan. 29, 2011).

6. See Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 14 (2009).

7. See *Wrongful Convictions Involving Unvalidated or Improper Forensic Science That Were Later Overturned Through DNA Testing*, THE INNOCENCE PROJECT, [http://www.innocenceproject.org/docs/DNA\\_Exonerations\\_Forensic\\_Science.pdf](http://www.innocenceproject.org/docs/DNA_Exonerations_Forensic_Science.pdf) (last visited Jan. 29, 2011).

8. *Id.*

over, many people firmly believe that unvalidated arson testimony resulted in Cameron Todd Willingham's wrongful execution in Texas in 2004.<sup>9</sup>

The crime laboratory problems and wrongful convictions have captured the attention of the nation's courts. In June 2009, the U.S. Supreme Court acknowledged that "[s]erious deficiencies have been found in the forensic evidence used in criminal trials" and that "[f]orensic evidence is not uniquely immune from the risk of manipulation."<sup>10</sup> The Court acknowledged, more importantly, that "[t]he legal community now concedes, with varying degrees of urgency, that our [criminal justice] system produces erroneous convictions based on discredited forensics."<sup>11</sup>

In making its observations, the Supreme Court referenced the National Academy of Sciences (NAS) February 2009 report entitled *Strengthening Forensic Science in the United States: A Path Forward*.<sup>12</sup> The NAS published its report after studying the forensic science community for more than two years.<sup>13</sup> As Thomas Bohan, the past President of the American Academy of Forensic Science (AAFS), recently wrote: "*Strengthening Forensic Science in the United States* is a long-needed, long-awaited start in mending the problems known to exist

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9. For a complete history of the Willingham case, see *Cameron Todd Willingham — Innocent and Executed*, TEX. MORATORIUM NETWORK, <http://camerontoddwillingham.com> (last visited Oct. 6, 2010).

10. *Melendez-Diaz v. Massachusetts*, 129 S. Ct. 2527, 2536, 2537 (2009).

11. *Id.* at 2537. Several other courts or judges have made similar comments. For instance, Sixth Circuit Court of Appeals Judge Boyce Martin called crime labs "unreliable." *Moore v. Parker*, 425 F.3d 250, 269 (6th Cir. 2005) (Boyce, J., dissenting). Elsewhere, Federal District Court Judge Jed Rakoff wrote: "False positives—that is, inaccurate incriminating test results—are endemic to much of what passes for 'forensic science.'" *United States v. Bentham*, 414 F. Supp. 2d. 472, 473 (S.D.N.Y. 2006). And Federal District Court Judge Nancy Gertner commented on the noticeable correlation between wrongful convictions and unreliable or invalid forensic science, noting that "recent reexaminations of relatively established forensic testimony have produced striking results." *United States v. Green*, 405 F. Supp. 2d 104, 109 n.6 (D. Mass. 2005).

12. NAT'L RESEARCH COUNCIL, NAT'L ACAD. OF SCIS., *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* 42 (2009) [hereinafter NAS REPORT], <http://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf>.

13. Recognizing the "rising nationwide criticism of forensic evidence," *Ramirez v. State*, 810 So. 2d 836, 853 (Fla. 2001), and that "significant improvements [were] needed in forensic science," NAS REPORT, *supra* note 12, at xix, Congress directed the NAS "to conduct a study on forensic science," *id.* at 1. In the fall of 2006, the NAS established a committee to implement Congress's charge. *Id.* at 2. The committee included members of the forensic science, legal, and science communities. *Id.* The committee met on eight occasions between January 2007 and November 2008. *Id.* During these meetings, the "committee heard expert testimony" on several issues relating to the forensic science community. *Id.* Between meetings, committee members reviewed "numerous published materials, studies, and reports related to the forensic science disciplines, engaged in independent research on the subject, and worked on drafts of the final report." *Id.* The Committee issued its final report on February 17, 2009. *Id.*

within the criminal justice system.”<sup>14</sup> Carol Henderson, another past President of the AAFS echoed Bohan’s statement when she said, “We have been presented with an opportunity to make forensic science service justice even more reliably and effectively. This is the time to build a better ‘forensic science.’”<sup>15</sup>

At the outset, the *NAS Report* acknowledged what had become painfully obvious in the years preceding the report—that unvalidated and improper forensic evidence and exaggerated forensic testimony mislead fact-finders and contributed to an alarming number of wrongful convictions.<sup>16</sup> The *NAS Report* stated:

[Advances in DNA testing have] revealed that, in some cases, substantive information and testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people. This fact has demonstrated the potential danger of giving undue weight to evidence and testimony derived from imperfect testing and analysis. Moreover, imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence.<sup>17</sup>

The *NAS Report* also commented:

The number of exonerations resulting from the analysis of DNA has grown across the country in recent years, uncovering a disturbing number of wrongful convictions—some for capital crimes—and exposing serious limitations in some of the forensic science approaches commonly used in the United States.<sup>18</sup>

The *NAS Report* commented on the crime laboratory problem as well:

In recent years, the integrity of crime laboratories increasingly has been called into question, with some highly publicized cases highlighting the sometimes lax standards of laboratories that have generated questionable or fraudulent evidence and that have lacked quality control measures that would have detected the questionable evidence.<sup>19</sup>

The following passage captures the *NAS Report’s* overall findings regarding forensic science:

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14. Thomas L. Bohan, *Review of: Strengthening Forensic Science in the United States: A Path Forward*, 55 J. FORENSIC SCI. 560, 564 (2010).

15. *Strengthening Forensic Science in the United States: The Role of the National Institute of Standards and Technology: Hearing Before the Subcomm. on Tech. and Innovation of the H. Comm. on Sci. and Tech.*, 111th Cong. 14–19 (2009) (statement of Carol E. Henderson, Professor, Stetson University College of Law).

16. For a more in-depth discussion of forensic science and wrongful convictions, see Garrett & Neufeld, *supra* note 6, and Craig M. Cooley & Gabriel S. Oberfield, *Increasing Forensic Evidence’s Reliability and Minimizing Wrongful Convictions: Applying Daubert Isn’t the Only Problem*, 43 TULSA L. REV. 285 (2007).

17. *NAS Report*, *supra* note 12, at 4.

18. *Id.* at 42.

19. *Id.* at 44.

Too often [forensic science facilities] have inadequate educational programs, and they typically lack mandatory and enforceable standards, founded on rigorous research and testing, certification requirements, and accreditation programs. Additionally, forensic science and forensic pathology research, education, and training lack strong ties to our research universities and national science assets.<sup>20</sup>

The *NAS Report* stressed that “substantial improvement is necessary in the forensic science disciplines to enhance law enforcement’s ability to identify those who have or have not committed a crime and to prevent the criminal justice system from erroneously convicting or exonerating the persons who come before it.”<sup>21</sup>

In summary, research has not yet demonstrated the validity of many forensic science disciplines and, as a field, forensic science is insufficiently connected to the university research base. While this is disheartening, and significantly increases the likelihood of injustices and missed opportunities of justice, it merely begs the question of why so few forensic disciplines have been validated and why there are so few Ph.D.-trained scientists in forensic science. The answer is multi-layered, but two factors provide a strong starting point: inadequate funding and lack of strict government oversight.

In terms of funding, forensic science often competes with other law enforcement priorities, receiving inadequate funding to: (1) develop top-notch undergraduate and graduate level forensic science programs at universities; (2) hire an adequate number of forensic scientists so our nation’s public crime laboratories can effectively, efficiently, and accurately process the increasing number of forensic testing requests; (3) modernize our nation’s public crime laboratories with the most up-to-date and state-of-the-art technology; and (4) conduct sound research and develop new technologies that can aid in furthering the criminal justice system’s dual purpose of protecting the innocent and identifying (and punishing) the guilty.

In terms of oversight, forensic science has never been required to submit to any governing entity but itself. Unlike clinical laborato-

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20. *Id.*

21. *Id.* at 37. State agencies and task forces that have investigated their respective state’s forensic science community and wrongful convictions in their respective states have made similar conclusions to the *NAS REPORT*. For instance, the New York State Bar Association’s Task Force on Wrongful Convictions reviewed fifty-three “wrongly obtained” convictions. N.Y. STATE BAR ASS’N, PRELIMINARY REPORT OF THE N.Y. STATE BAR ASS’N’S TASK FORCE ON WRONGFUL CONVICTIONS 5 (Jan. 2009). The Task Force described the fifty-three cases in the following manner: “The Task Force does not express an opinion that all [fifty-three] exonerees were actually innocent. However, while some individuals may not have been, in fact, innocent, in all these cases the criminal justice system broke down to the degree that a conviction was wrongly obtained.” *Id.* at 5. After its review the Task Force concluded that “myriad failures related to the handling of forensic evidence and the conduct of crime scene investigations contribute significantly to wrongful conviction.” *Id.* at 89.

ries—which are heavily regulated—there are no federal or state laws or agencies aimed at ensuring that our nation’s crime laboratories and forensic personnel are producing accurate and verifiable results. The lack of oversight has led to a forensic science industry that has, at a national level: (1) no standards for many forensic identification techniques; (2) no uniformity in the certification of forensic practitioners, or in the accreditation of crime laboratories; and (3) no entity that can adequately investigate claims of negligence, incompetence, or misconduct.

This Article’s objective will be to discuss why adequate funding and strict government oversight are necessary to strengthening the forensic science community’s scientific foundation and improve its accuracy and efficiency. If lawmakers refuse to properly fund and oversee the forensic science community, the criminal justice system’s truth-seeking mission will continue to be compromised. This not only harms innocent people, who are falsely implicated by unvalidated forensic evidence or improper forensic testimony, it inflicts another wound to the victims and their families.

## II. FORENSIC SCIENCE REFORMS

### A. *Increased Funding*

Forensic science has been inadequately funded for far too long. Forensic science pioneer, James W. Osterburg, made the following observation four decades ago:

Crime laboratories have existed in the United States for a little over a third of a century. . . . With very few exceptions, [however,] almost no research has been conducted . . . in the field. This is attributable . . . to three factors: *lack of funds*, lack of research-oriented personnel, and lack of encouragement bordering on active discouragement by police administrators.<sup>22</sup>

In 1967, President Lyndon Johnson’s Crime Commission commented that “the great majority of police department laboratories have only minimal equipment and lack highly skilled personnel able to use the modern equipment now being developed and produced by the instrumentation industry.”<sup>23</sup> In 1974, President Richard Nixon’s Crime Commission also addressed the subject, concluding that “[t]oo many police crime laboratories have been set up on budgets that preclude the recruitment of qualified professional personnel” and “[t]oo often the laboratory is not considered a primary budget item and is one of the first units to suffer when budgets are trimmed. Such prac-

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22. James Osterburg, *What Problems Must Criminalistics Solve*, 59 J. CRIM. L. & CRIMINOLOGY 427, 427 (1968) (emphasis added).

23. PRESIDENT’S COMM’N ON LAW ENFORCEMENT AND ADMIN. OF JUSTICE, *THE CHALLENGE OF CRIME IN A FREE SOCIETY* 255 (1967), <http://www.ncjrs.gov/pdffiles1/nij/42.pdf>.

tices relegate the crime laboratory to an inferior position among other support services.”<sup>24</sup>

In 2001, a crime laboratory director explained to Congress that while “the use of forensic science by the criminal justice system has increased dramatically over the past several years, [forensic science] funding has not.”<sup>25</sup> In 2004, another forensic analyst stressed the need for adequate funding because a “budget crisis exists in many forensic services programs.”<sup>26</sup> Inadequate funding, for example, was cited as a major contributing factor to the Houston crime laboratory debacle.<sup>27</sup>

The *NAS Report*, not surprisingly, concurred with these statements, finding that “funding for laboratories has not increased with increasing demands,” and observing that “[s]ome laboratory directors appearing before the committee cited budget cuts as high as 22 percent over the past five years.”<sup>28</sup> The *NAS Report* said it best when it said that there “are scores of talented and dedicated people in the forensic science community,” but they are “often strapped in their work” because of the “lack of adequate resources, sound policies, and national support.”<sup>29</sup>

The NAS Committee made these comments even though Congress enacted the Paul Coverdell National Forensic Science Improvement Act in 2000,<sup>30</sup> which created the Paul Coverdell Forensic Science Improvement Grants Program. The Grant Program “awards grants to states and units of local government to help improve the quality and timeliness of forensic science and medical examiner services.”<sup>31</sup> In 2004, the Justice for All Act<sup>32</sup> expanded the Coverdell program, with the aim of reducing DNA testing backlogs in many states. Between 2002 and 2009, the Grant Program awarded \$103,426,142 to local and

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24. NAT’L ADVISORY COMM’N ON CRIMINAL JUSTICE STANDARDS AND GOALS, REPORT ON POLICE 304–05 (1974).

25. *DNA Crime Labs: The Paul Coverdell National Forensic Sciences Improvement Act: Hearing on S. 3045 Before the S. Judiciary Comm.*, 107th Cong. 14 (2001) [hereinafter *DNA Crime Labs Hearing*] (statement of Keith Kenneth Coonrod, Director of Toxicology, Drug Chemistry, Trace and Breath Testing, N.Y. State Police).

26. Perry M. Koussiafes, *Public Forensic Science Laboratory Budget Issues*, 6 FORENSIC SCI. COMM. 3 (2004), [http://www.fbi.gov/hq/lab/fsc/backissu/july2004/research/2004\\_03\\_research05.htm](http://www.fbi.gov/hq/lab/fsc/backissu/july2004/research/2004_03_research05.htm).

27. MICHAEL R. BROMWICH, THIRD REPORT OF THE INDEP. INVESTIGATOR FOR THE HOUS. POLICE DEP’T CRIME LAB. AND PROP. ROOM 62 (2005), <http://www.bioforensics.com/conference07/Manipulation/050630report.pdf>.

28. NAS REPORT, *supra* note 12, at 58–59.

29. *Id.* at xix.

30. Paul Coverdell National Forensic Sciences Improvement Act, Pub. L. No. 106–561, §§ 1–4, 114 Stat. 2788 (codified in scattered sections of 18 and 42 U.S.C.). For more comprehensive information about the Paul Coverdell National Forensic Science Improvement Act, see *Coverdell Forensic Science Improvement Grants Program*, NIJ, <http://www.ojp.usdoj.gov/nij/topics/forensics/lab-operations/capacity/nfsia/welcome.htm> (last updated Sept. 29, 2009).

31. See NIJ, *supra* note 30.

32. 18 U.S.C. § 3600A (2006).



state forensic service providers.<sup>33</sup> Again—despite this funding—the NAS Committee concluded that more funding is needed to strengthen forensic science.

Increased funding will achieve at least three objectives. First, it will allow forensic service providers to modernize their facilities and hire more forensic analysts. Second, it will improve graduate and undergraduate forensic science education. Third, it will lead to more research opportunities in forensic science.

### 1. Modernization and Man Power

To perform their duties accurately and efficiently, public crime laboratories must be stocked with state-of-the-art technology and man power. Purchasing modern technology and hiring more analysts comes at a high price.<sup>34</sup> For instance, in terms of crime laboratory modernization, congressional testimony in 2001 suggested that \$1.3 billion was needed to refurbish older crime laboratories, while another \$285 million was needed to purchase the necessary state-of-the-art equipment to make these crime laboratories fully functional.<sup>35</sup> This number is surely much higher now. More states, additionally, are requiring crime laboratories to be accredited,<sup>36</sup> and the accreditation process is quite expansive.<sup>37</sup> Simply put, if lawmakers do not increase funding for modernization, public crime laboratories cannot conduct accurate and methodical forensic examinations, which in turn will lead to injustices and missed opportunities of justice.

Lawmakers, it seems, have finally grasped the scope of the crime laboratory problem. This awareness, for instance, played a significant role in Congress' decision to enact four bills aimed at addressing the modernization and man power issues: (1) the Paul Coverdell National

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33. See NIJ, *supra* note 30.

34. See *DNA Crime Labs Hearing*, *supra* note 25, at 37–38 (statement of Eric Buel, Ph.D., Director, Vermont Forensic Lab).

35. *Id.* at 15 (statement of Keith Kenneth Coonrod, Director of Toxicology, Drug Chemistry, Trace and Breath Testing, N.Y. State Police).

36. See CAL. PENAL CODE § 297 (West 2008) (requiring accreditation of DNA units by ASCLD/LAB or any certifying body approved by ASCLD/LAB); MINN. STAT. ANN. § 299C.156(2)(4) (West 2007) (specifying that Forensic Laboratory Advisory Board should encourage accreditation by ASCLD/LAB or other accrediting body); N.Y. EXEC. LAW § 995b (McKinney 1995 & Supp. 2010) (requiring accreditation by the state Forensic Science Commission); OKLA. STAT. ANN. tit. 74, § 150.37 (West Supp. 2010) (requiring accreditation by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (“ASCLD/LAB”) or the American Board of Forensic Toxicology); TEX. CODE CRIM. PROC. ANN. art. 38.35 (West Supp. 2010) (requiring accreditation by the Department of Public Safety).

37. See NAT'L CRIMINAL JUSTICE REFERENCE SERV., STATUS AND NEEDS OF FORENSIC SCIENCE SERVICE PROVIDERS: A REPORT TO CONGRESS 6 (2006), <http://www.ncjrs.gov/pdffiles1/nij/213420.pdf> (“[M]any laboratories are confronted with budgets that are insufficient to meet caseload demands and at the same time support participation in accreditation and certification programs.”).

Forensic Sciences Improvement Act of 2000;<sup>38</sup> (2) the DNA Analysis Backlog Elimination Act of 2000;<sup>39</sup> and (3) the Innocence Protection Act of 2001,<sup>40</sup> which became law in 2004 as part of the Justice for All Act.<sup>41</sup> Nonetheless, while many public crime laboratories have received additional funding under these programs, most still face significant budgetary issues that prevent them from processing and examining forensic evidence quickly, efficiently, and accurately.<sup>42</sup> Indeed, much of the new money directed at public crime laboratories over the last decade has not been used to modernize them or to support whole laboratory efforts, but have been directed to specifically decrease DNA testing backlogs.<sup>43</sup> As Professor Joseph Peterson observed: “We pour resources into DNA typing but fail to devote the necessary funds to the collection and analysis of other types of evidence in crime laboratories.”<sup>44</sup>

While modernization has been a significant issue for public crime laboratories, a bigger problem is man power or personnel issues. In a 2004 report to Congress, forensic service providers “identified personnel as its primary need,”<sup>45</sup> an emphasized that “[w]hen the demand for services exceeds a service provider’s capacity to analyze the submitted evidence, backlogs result.”<sup>46</sup> Poor funding affects man power in at least two ways. First, public crime laboratories cannot hire sufficient analysts to handle the increasing number of forensic testing re-

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38. Paul Coverdell National Forensic Sciences Improvement Act, Pub. L. No. 106-561, §§ 1–4, 114 Stat. 2788 (2000) (codified in scattered sections of 18 and 42 U.S.C.).

39. DNA Analysis Backlog Elimination Act of 2000, Pub. L. No. 106-546, §§ 1–11, 114 Stat. 2726 (2000) (codified in scattered sections of 10, 18, and 42 U.S.C.).

40. Innocence Protection Act of 2001, S. 486, 107th Cong., §§ 1–307 (2001) (codified at 18 U.S.C. § 3600 (2006)). A summary of the legislative history of the Act can be found in S. REP. NO. 107-315, at 2–8 (2002).

41. Justice for All Act of 2004, Pub. L. No. 108-405, 118 Stat. 2260 (2004) (codified in scattered sections of 10, 18, 28, and 42 U.S.C.). The Innocence Protection Act is Title IV of the Justice for All Act of 2004. *See id.* at § 401–32, 118 Stat. at 2260–61.

42. *See, e.g.*, James-Rufus Koren, *Union Says County Should Hold Off on Crime Lab*, SAN BERNARDINO COUNTY SUN (Cal.), June 16, 2010, <http://www.allbusiness.com/government/government-bodies-offices-regional/14643554-1.html> (discussing how San Bernardino County might not be able to build a new modern-crime laboratory because of budgetary issues); Linda Trischitta, *Don't Cut Sheriff's Crime Lab, Budget Leaders Urge Broward County Commission*, SOUTH FLORIDA SUN-SENTINEL, June 17, 2010, [http://articles.sun-sentinel.com/2010-06-16/news/fl-deerfield-sheriff-crime-lab-20100615\\_1\\_crime-lab-sheriff-al-lamberti-county-commissioners](http://articles.sun-sentinel.com/2010-06-16/news/fl-deerfield-sheriff-crime-lab-20100615_1_crime-lab-sheriff-al-lamberti-county-commissioners) (discussing how Broward County, Florida officials are having a difficult time determining how to raise the nearly \$8 million dollars that is needed to keep the Broward County crime laboratory open).

43. *See* Erin Murphy, *What ‘Strengthening Forensic Science’ Today Means for Tomorrow: DNA Exceptionalism and the 2009 NAS Report*, 9 LAW, PROBABILITY & RISK 7, 9–12 (2010).

44. Joseph L. Peterson & Anna S. Leggett, *The Evolution of Forensic Science: Progress Amid the Pitfalls*, 36 STETSON L. REV. 621, 622 (2007).

45. NAT’L CRIMINAL JUSTICE REFERENCE SERV., *supra* note 37, at 12.

46. *Id.*

quests.<sup>47</sup> Second, poor funding leads to inadequate salaries which lead to high turnover rates.<sup>48</sup> Understaffing leads to backlogs, which lead to higher caseloads and perpetuates larger backlogs. These circumstances increase the likelihood that shortcuts and mistakes will continue to occur.

## 2. Graduate Education and Forensic Science Research

Many of the hard-working and committed forensic analysts working in our nation's public crime laboratories are inadequately trained and educated in the biological sciences, the scientific method, and statistics.<sup>49</sup> Inadequate scientific research training not only increases the likelihood of errors, but also hinders the conduct and proper evaluation of empirical research in the forensic sciences. In 2003, Kenneth Melson, the AAFS President at the time, made the following comment regarding forensic science research needs:

[M]ore research is needed in the techniques and science already in use. With the importance of forensic science to truth and justice, the science employed and relied upon by judges and juries must be valid. *It does not matter how well forensic scientists abide by testing protocols or how reliable the techniques are, if the underlying science does not actually reveal what the expert says it does.* Method validation studies and new research must be ongoing even in the areas of traditional forensic science disciplines. Justice demands good science and we have an obligation to provide it. We can no longer expect the courts or public to accept the truth of our science merely because we say it is good. In order to maintain the integrity of both the science and the justice system, we must prove that it is so. Moreover, we cannot overlook the fact that scientific evidence was presented at many of the trials where innocent people were convicted and later exonerated by DNA. The evidence in many of the trials showed associations between the defendants and the victims or crime scenes. While modern day science is exonerating the innocent, it is also showing us that some inferences drawn from scientific associations in the past were wrong. The use of DNA to exonerate wrongly convicted persons has certainly taught us lessons about forensic science in general and underscores the importance of continuing research.<sup>50</sup>

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47. W. Mark Dale & Wendy S. Becker, *Strategy for Staffing Forensic Scientists*, 48 J. FORENSIC SCI. 465, 466 (2003) (noting that "an additional 10,000 new forensic scientists are needed nationwide over the next decade to address the expanding case backlog").

48. See NIJ, REPORT TO THE ATTORNEY GENERAL ON DELAYS IN FORENSIC DNA ANALYSIS 2 (2003), <http://www.ncjrs.gov/pdffiles1/nij/199425.pdf> ("Public crime labs report that they face substantial staff retention problems. Public crime lab salaries are often below the salaries paid by the private sector.").

49. See Craig M. Cooley, *Forensic Science and Capital Punishment Reform: An "Intellectually Honest" Assessment*, 17 GEO. MASON U. C.R. L.J. 299, 396-406 (2007).

50. Kenneth E. Melson, *President's Editorial: The Journey to Justice*, 48 J. FORENSIC SCI. 705, 707 (2003) (emphasis added).

Despite Melson's call for more research, little changed in the intervening years. Indeed, when the NAS Committee revisited the research issue five years after Melson's comments, it concluded that all of the non-DNA forensic identification techniques were not adequately supported by empirical research. For instance, while forensic dentists may claim bite marks can be individualized, there is insufficient empirical research to make such a claim. In other words, many claims made by forensic identification examiners have not been scientifically validated and are currently unsupported by the scientific literature. The *NAS Report* repeatedly acknowledged that there is inadequate research:

The fact is that many forensic tests—such as those used to infer the source of toolmarks and bite marks—have never been exposed to stringent scientific scrutiny. Most of these techniques were developed in crime laboratories to aid in the investigation of evidence from a particular crime scene, and researching their limitations and foundations was never a top priority.<sup>51</sup>

The *NAS Report* also stated:

The simple reality is that the interpretation of forensic evidence is not always based on scientific studies to determine its validity. This is a serious problem. Although research has been done in some disciplines, there is a notable dearth of peer-reviewed, published studies establishing the scientific bases and validity of many forensic methods.<sup>52</sup>

The *NAS Report* added:

[S]ome forensic science disciplines are supported by little rigorous systematic research to validate the discipline's basic premises and techniques. There is no evident reason why such research cannot be conducted.<sup>53</sup>

The *NAS Report* also stated:

Much forensic evidence—including, for example, bite marks and firearm toolmarks identifications—is introduced in criminal trials without any meaningful scientific validation, determination of error rates, or reliability testing to explain the limits of the discipline.<sup>54</sup>

The lack of research dates back at least to the late 1980s:

Before the first offering of the use of DNA in forensic science in 1986, no concerted effort had been made to determine the reliability of these tests, and some in the forensic science and law enforcement communities believed that scientists' ability to withstand cross-examination in court when giving testimony related to these tests was

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51. *NAS Report*, *supra* note 12, at 42.

52. *Id.* at 8.

53. *Id.* at 22; *see also id.* at 187 ("the forensic science disciplines suffer from an inadequate research base").

54. *Id.* at 107–08.

sufficient to demonstrate the tests' reliability. However, although the precise error rates of these forensic tests are still unknown, comparison of their results with DNA testing in the same cases has revealed that some of these analyses, as currently performed, produce erroneous results.<sup>55</sup>

The *NAS Report* also criticized the use of assumptions in forensic conclusions in the absence of base rate research. One purpose of forensic evidence is to connect a piece of evidence with one source—individuality. True individuality is not a legitimate scientific expectation, even for DNA testing.<sup>56</sup> Scientifically, forensic examiners should limit conclusions to the likelihood of a coincidental match—i.e., the conditional probability that a randomly-selected individual or object would share the same characteristic(s) as the crime scene print or mark. Determining the likelihood of a coincidental match, however, requires base rate data regarding the commonality or rarity of the characteristic(s) or feature(s) under investigation. As the *NAS Report* repeatedly noted, the absence of base rate data limits the conclusions made by forensic identification examiners:

With the exception of nuclear DNA analysis, however, no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source. In terms of scientific basis, the analytically based disciplines generally hold a notable edge over disciplines based on expert interpretation.<sup>57</sup>

With no base rate data, many forensic examiners routinely make unjustifiable probabilistic claims based on their experience. The *NAS Report* criticized such testimony and urged the forensic science community to undertake base rate research:

In most forensic science disciplines, no studies have been conducted of large populations to establish the uniqueness of marks or features. Yet, despite the lack of a statistical foundation, examiners make probabilistic claims based on their experience. A statistical framework that allows quantification of these claims is greatly needed.<sup>58</sup>

The *NAS Report* criticized such testimony due to the inherent limitations of human intuition:

[H]uman intuition is not a good substitute for careful reasoning when probabilities are concerned. As an example, consider a prob-

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55. *Id.* at 42.

56. See JOHN M. BUTLER, *FORENSIC DNA TYPING: BIOLOGY, TECHNOLOGY, AND GENETICS OF STR MARKERS* 27 (Elsevier Academic Press, 2d ed. 2005) (noting that “absolute certainty in DNA identification is not possible in practice” and explaining that “the next best thing is to claim virtual certainty due to the extreme small probabilities of a coincidental (random) match”).

57. *NAS Report*, *supra* note 12, at 7.

58. *Id.* at 188–89.

lem commonly posed in beginning statistics classes: How many people must be in a room before there is a 50 percent probability that at least two will share a common birthday? Intuition might suggest a large number, perhaps over 100, but the actual answer is 23. This is not difficult to prove through careful logic, but intuition is likely to be misleading.<sup>59</sup>

For instance, the *NAS Report* commented on the correlation between experienced-based bite mark testimony and wrongful convictions:

Testimony of experts generally is based on their experience and their particular method of analysis of the bite mark. Some convictions based mainly on testimony by experts indicating the identification of an individual based on a bite mark have been overturned as a result of the provision of compelling evidence to the contrary (usually DNA evidence).<sup>60</sup>

An off-shoot of base rate research is research focused on intraindividual variability and interindividual variability. This type of research is also non-existent in forensic science:

For the identification sciences (e.g., friction ridge analysis, toolmark analysis, handwriting analysis), such studies would accumulate data about the intraindividual variability (e.g., how much one finger's impressions vary from impression to impression, or how much one toolmark or signature varies from instance to instance) and the interindividual variability (e.g., how much the impressions of many fingerprints vary across a population and in what ways). With that information, one could begin to attach confidence limits to individualization determinations and also begin to develop an understanding of how much similarity is needed in order to attain a given level of confidence that a match exists.<sup>61</sup>

The *NAS Report* also emphasized that forensic science has conducted very little error rate research.<sup>62</sup> In the courtroom setting, the need for error rate data is critical because, without such data, the fact finder cannot accurately gauge the evidence's validity and, ultimately, its probative value.<sup>63</sup> Despite the importance of error rate data, "in most areas of forensic science, no well-defined system exists for determining error rates, and proficiency testing shows that some examiners perform poorly."<sup>64</sup> Moreover, when proficiency tests have been conducted, they have not been "sufficiently rigorous" and do not mimic

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59. *Id.* at 124.

60. *Id.* at 175.

61. *Id.* at 184.

62. *Id.* at 188.

63. *Id.* at 184 ("[T]he accuracy of forensic methods resulting in classification or individualization conclusions needs to be evaluated in well-designed and rigorously conducted studies. The level of accuracy of an analysis is likely to be a key determinant of its ultimate probative value.").

64. *Id.* at 188; *see also id.* at 184 ("Few forensic science methods have developed adequate measures of the accuracy of inferences made by forensic scientists.").

real case conditions, and thus, offer no real value to the critical question of how accurately forensic examiners perform these techniques.<sup>65</sup> Lastly, the few “adequate” proficiency tests that have been conducted raise serious questions whether forensic examiners can accurately link an unknown mark, print, or impression to a known mark, print, or impression. Indeed, the *NAS Report* concluded that “[a]ssertions of a ‘100 percent match’ contradict the findings of proficiency tests that find substantial rates of erroneous results in some disciplines.”<sup>66</sup>

The lack of empirical research forces forensic examiners to base their conclusions on their “experience” rather than verifiable empirical research. Experience, however, is not an accurate gauge of validity or reliability. Without empirical research to substantiate the forensic technique’s validity and the examiner’s reliability, a forensic examiner can quite easily base a lifetime of conclusions on faulty premises or claims. Arson investigation is an excellent example. For years, arson investigators relied on unsubstantiated myths about burn patterns and the behavior of fire to determine whether a fire was purposely or accidentally set.<sup>67</sup> When comprehensive experiments were actually conducted in the early 1990s, the data revealed that many of the burn patterns myths were invalid.<sup>68</sup> Thousands of arrests and convictions, however, have been based on these faulty burn pattern myths—including Cameron Todd Willingham’s conviction, death sen-

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65. *Id.* at 206 (“Although many forensic science disciplines have engaged in proficiency testing for the past several decades, several courts have noted that proficiency testing in some disciplines is not sufficiently rigorous.”). For example, a federal district court noted that “the FBI [fingerprint] examiners got very high proficiency grades, but the tests they took did not . . . [O]n the present record I conclude that the proficiency tests are less demanding than they should be.” *United States v. Llera Plaza*, 188 F. Supp. 2d 549, 565 (E.D. Pa. 2002). Similarly, another federal district court said this about a document examiner’s remarkable ability to score perfectly on all his proficiency tests: “There were aspects of Mr. Cawley’s testimony that undermined his credibility. Mr. Cawley testified that he achieved a 100% passage rate on the proficiency tests that he took and that all of his peers *always* passed their proficiency tests. Mr. Cawley said that his peers *always* agreed with each others’ results and *always* got it right. Peer review in such a ‘Lake Woebegone’ environment is not meaningful.” *United States v. Lewis*, 220 F. Supp. 2d 548, 554 (S.D. W. Va. 2002); *see also* *United States v. Crisp*, 324 F.3d 261, 274 (4th Cir. 2003) (Michael, J., dissenting) (“Proficiency testing is typically based on a study of prints that are far superior to those usually retrieved from a crime scene.”).

66. *NAS Report*, *supra* note 12, at 47.

67. *See* Angelo L. Pisani, Jr., *Historical Perspective on Arson Evidence*, in *PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON THE FORENSIC ASPECTS OF ARSON INVESTIGATIONS* 3, 4 (1995) (commenting on past fire investigation literature and saying “much of it is not supported by science”).

68. *See* Technical Comm. on Fire Investigations, Nat’l Fire Prot. Ass’n, *NFPA 921: GUIDE FOR FIRE & EXPLOSION INVESTIGATIONS* (1992); *see also* Richard L.P. Custer, *Considerations for Arson Investigations in NFPA 921 – Guide for Fire and Explosion Investigations*, in *PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON THE FORENSIC ASPECTS OF ARSON INVESTIGATIONS* 31, 31 (1995).

tence, and 2004 execution.<sup>69</sup> The same can be said with respect to the FBI's comparative lead bullet analysis technique (CBLA). For more than three decades, the FBI relied on CBLA to link a discharged bullet to a box of bullets in the defendant's possession.<sup>70</sup> However, the FBI failed to conduct rigorous empirical research to adequately determine whether CBLA's fundamental assumptions were in fact valid. The FBI simply assumed the technique's validity—and presented CBLA evidence in courts of law as scientific fact. When the National Academy of Sciences examined CBLA's underlying premises, it concluded that the limited empirical data did not support the conclusions and inferences being drawn by FBI metallurgists.<sup>71</sup>

There are many reasons for the inadequacies in forensic science education and research, but poor funding appears to be a significant factor. For nearly a century, few universities have offered comprehensive college level forensic science programs, particularly Master's and Ph.D. programs. Inadequate educational funding is directly related to inadequate funding for forensic science research. Consequently, insufficient funding for both areas created a "vicious cycle" in forensic science, which the *NAS Report* explained:

Many forensic degree programs are found at small colleges or universities with few graduate programs in science and where research resources are limited. The lack of research funding has discouraged universities in the United States from developing research-based forensic degree programs, which leads to limited opportunities to attract graduate students into such programs. Only a few universities offer Ph.D.-level education and research opportunities in forensic science, and these are chemistry or biology programs with a forensic science focus. Most graduate programs in forensic science are master's programs, where financial support for graduate study is limited.

In addition, the lack of research funds means that universities are unlikely to develop research programs in forensic science. This lack of

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69. See David Grann, *Trial by Fire: Did Texas Execute an Innocent Man?*, *NEW YORKER*, Sept. 7, 2009, [www.newyorker.com/reporting/2009/09/07/090907fa\\_fact\\_grann](http://www.newyorker.com/reporting/2009/09/07/090907fa_fact_grann).

70. See, e.g., *United States v. Davis*, 103 F.3d 660, 666 (8th Cir. 1996) ("An expert testified that such a finding is rare and that the bullets must have come from the same box or from another box that would have been made by the same company on the same day."); *Commonwealth v. Daye*, 587 N.E.2d 194, 207 (Mass. 1992) ("Special agent John Riley at the Federal Bureau of Investigation testified that two bullet fragments found in [the victim's] body came from the same box of ammunition or from different boxes that were manufactured at the same place on or about the same date as a bullet retrieved from [the defendant's basement]."); *State v. King*, 546 S.E.2d 575, 584 (N.C. 2001) ("[The FBI analyst] opined that, based on her lead analysis, the bullets she examined either came from the same box of cartridges or came from different boxes of the same caliber, manufactured at the same time.").

71. See COMM. ON SCIENTIFIC ASSESSMENT OF BULLET LEAD ELEMENTAL COMPOSITION COMPARISON, NAT'L RESEARCH COUNCIL, *FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE* (2004).



funding discourages top scientists from exploring the many scientific issues in the forensic science disciplines. This has become a *vicious cycle* during which the lack of funding keeps top scientists away and their unavailability discourages funding agencies from investing in forensic science research. Traditional funding agencies have never had a mission to support forensic science research.<sup>72</sup>

There are at least three reasons why lawmakers did not allocate adequate research funding to forensic science. First, courts routinely admitted forensic identification evidence under *Frye v. United States*<sup>73</sup> for nearly seventy years until the U.S. Supreme Court decided *Daubert v. Merrell Dow Pharmaceuticals*.<sup>74</sup> Because courts regularly accepted the notion that fingerprints, bite marks, and toolmarks were unique, and that adequately trained forensic identification examiners can link an unknown impression or mark to the one and only person or object in the world that created the impression or mark, there was no compelling reason to allocate already limited funds for forensic science research—especially if these forensic identification techniques were enabling prosecutors to obtain convictions. It was not until the Supreme Court decided *Daubert*, and courts started critically examining the non-DNA forensic identification techniques, that additional funding was allocated for forensic identification research. In other words, only when convictions were jeopardized, and the public's safety allegedly placed in peril, was research funding considered a priority.

Second, for nearly a century lawmakers assumed, like many people, that forensic identification examiners were infallible because “the evidence doesn’t lie.”<sup>75</sup> If no errors were being made, and innocent people were not being wrongly convicted, why would taxpayer dollars need to be spent on forensic identification research? The assumption that forensic identification techniques are infallible is attributable to the fact that these techniques do not have an error feedback system.<sup>76</sup> For instance, once an examiner makes an identification, there is, presumably, only one way to conclusively determine whether the examiner correctly linked the unknown bite mark or hair to the true assailant: DNA testing. Once DNA testing became a validated tool in the criminal justice system, particularly in the post-conviction context,

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72. *NAS Report*, *supra* note 12, at 230–231 (emphasis added).

73. *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), *superseded by statute*, FED. R. EVID. 402, *as recognized in* *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).

74. *Daubert*, 509 U.S. 579.

75. *See* *State v. Quintana*, 2004 UT App 418, ¶ 13, 103 P.3d 168 (Thorne, J., concurring) (“[W]e have adopted a cultural assumption that a government representative’s assertion that a defendant’s fingerprint was found at a crime scene is an infallible fact, and not merely the examiner’s opinion.”). Consider the title of this forensic science book: ALFRED ALAN LEWIS & HERBERT LEON MACDONNELL, *THE EVIDENCE NEVER LIES: THE CASEBOOK OF A MODERN SHERLOCK HOLMES* (1984).

76. *See* Cooley, *supra* note 49, at 409–411.

it quickly became apparent that forensic identification evidence was not infallible because there were numerous cases where the DNA results directly contradicted a bite mark identification, a fingerprint identification, or a hair identification.<sup>77</sup> The criminal justice system only began relying on DNA testing two decades ago; for most of the twentieth century, therefore, prosecutors, judges, and lawmakers were unaware that forensic identification techniques were prone to error.

Third, prosecutors and law enforcement officials were not diligently lobbying lawmakers for forensic identification research funding. Professors Michael Saks and Michael Risinger provide the following explanation of why prosecutors and law enforcement did not pressure lawmakers for more forensic identification research funding and why they hesitated to change the status quo in forensic science:

From the perspective of prosecution and law enforcement, any . . . research can only result in a net loss. This is because in these areas there is generally a carefully fostered public perception of near infallibility. Study data revealing any significant error rate under common real-world conditions undermines that carefully cultivated public perception. In addition, study data which can show deficiencies in individual practitioners threaten these individuals' continued usefulness as effective witnesses. Valid or not . . . such testimony is extremely useful to a prosecutor personally convinced of the guilt of the defendant (which, given the partisan nature of the process, is essentially every prosecutor) and willing to use whatever the law allows to convince the jury of the same thing. The loss of such evidence would be especially impactful in cases where other admissible evidence against the defendant is weak. So research results calling into question the validity of such expertise, or defining its error rates, are profoundly threatening because they undermine a powerful tool in obtaining convictions, whatever the validity of the technique, and also because they threaten the status and livelihoods of the law enforcement team members who practice the putative expertise.<sup>78</sup>

As the abovementioned comments make clear, the fundamental issue with the current forensic science system is the dearth of supporting empirical research. While adequately funding crime laboratories solve short-term problems, such an approach will not solve the fundamental long-term problems facing forensic science. Judge Harry T. Edwards, the Co-Chair of the NAS Committee, echoed this in a recent presentation in Washington, D.C.:

I think that the most important part of our Committee's Report is its call for real science to support the forensic disciplines. *Simply increasing the number of staff within existing crime laboratories will*

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77. See Garrett & Neufeld, *supra* note 6.

78. D. Michael Risinger & Michael J. Saks, *Rationality, Research and Leviathan: Law Enforcement — Sponsored Research and the Criminal Process*, 2003 MICH. ST. L. REV. 1023, 1040 (2003).

*not solve the principal problems of the forensic science community.* What is needed is interdisciplinary, peer-reviewed, scientific research to determine the validity and reliability of existing disciplines and to achieve technological advancements. What we are talking about is adding a culture of “science” to the forensic science community. From what I have seen, we have a long way to go.<sup>79</sup>

To strengthen forensic science’s scientific foundation—and the “culture of science” in forensic science—tomorrow’s forensic examiners must be adequately trained and educated in science, the scientific method, and statistics. To develop well-rounded forensic analysts, we need top-notch forensic science programs at state and local universities—particularly Master’s and Ph.D. programs. A culture of science cannot be sustained for a field as diverse and important as forensic science without PhD programs that can produce generations of forensic scientists who have comprehensive research backgrounds, enabling them to perform the empirical research needed to strengthen forensic science’s scientific foundation. As the NAS Committee emphasized:

The validation of results over time increases confidence. Moreover, the scientific culture encourages continued questioning and improvement. Thus, the relevant scientific community continues to check that established results still hold under new conditions and that they continue to hold in the face of new knowledge. *The involvement of graduate student researchers in scientific research contributes greatly to this diligence, because part of their education is to read carefully and to question so-called established methods.* This culture leads to continued reexamination of past research and hence increased knowledge.<sup>80</sup>

Moreover, it is of critical importance that undergraduate students interested in the biological or physical sciences be encouraged to pursue graduate and post-doctoral research in one of the many areas of forensic science. Developing research intensive forensic science programs, however, requires lawmakers to allocate adequate funding for forensic science education and training purposes.

Funding can be directed in the form of research grants as well as education and training grants for graduate students in the forensic sciences. Forensic science graduate students must have the same resources as other Ph.D. students pursuing degrees in the biological or physical sciences. Because these graduate programs provide tuition and a stipend to their doctoral students, so to must forensic science doctoral programs. Moreover, in the life and physical sciences, uni-

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79. Harry T. Edwards, Senior Circuit Judge D.C. Cir., Co-Chair, Comm. on Identifying the Needs of the Forensic Sci. Cmty., Statement at the Conference on The Role of the Court in an Age of Developing Science & Technology: The National Academy of Science Report on Forensic Sciences: What it Means for the Bench and Bar (May 6, 2010) (emphasis added), *available at* [http://www.fd.org/pdf\\_lib/The%20Nas%20Report%20on%20Forensic%20Science.pdf](http://www.fd.org/pdf_lib/The%20Nas%20Report%20on%20Forensic%20Science.pdf).

80. NAS REPORT, *supra* note 12, at 114.

versities are the primary source of science education and research training before undergraduate, graduate, and post-doctoral students embark on public or private sector careers. Moving the center of forensic training and education to universities would not only re-position forensic science into an independent scientific framework with similar scientific resources, but it will ensure that the developing scientific knowledge and the culture of science are transferred to forensic scientists directly.

Funds must be prioritized for strategies that develop a culture of science in forensic science. This begins with funding for basic research, as recommended by the National Institute of Justice over a decade ago.<sup>81</sup> All research must be transparent, protected, and insulated from non-scientific influences, and meet the highest standards of science. For these reasons, funding must be directed to a scientific agency, not a law enforcement agency, to ensure that the grant-making process is independent, free of conflict, and decisions are made by individuals with comprehensive research training.<sup>82</sup> Second, funding must be directed to agencies and universities with elite scientific credentials who have a long and successful track record of developing intricate research projects aimed at producing new and valid information that can be used by scientists and policy-makers in a particular field. This is not to say that forensic identification examiners will not have a role in forensic science research—they must and surely will because they are the experts who understand the real life challenges of analyzing forensic evidence. However, most forensic examiners have not had the requisite research and analytical training to conduct sound empirical studies, and due to the interdisciplinary nature of forensic science, any research must necessarily include researchers from a variety of life and physical sciences. For these reasons, forensic ex-

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81. See NIJ, FORENSIC SCIENCES: REVIEW OF STATUS AND NEEDS (1999), <http://www.ncjrs.gov/pdffiles1/173412.pdf>.

82. Risinger & Saks, *supra* note 77, at 1042. After reviewing several law enforcement driven research studies, Professors Saks and Risinger made the following comments about the studies and their findings:

Various strategies appear to have been used to insure that any positive results will be exaggerated and any negative results will be glossed over. These include: (1) placing some propositions beyond the reach of empirical research; (2) using research designs which cannot generate clear data on individual practitioner competence; (3) manipulating test procedures in such a way as to change bad results into good results; (4) refusal to share data with researchers wishing to re-analyze the data; (5) encouraging overstated interpretations of data in published research reports; (6) conditioning access to case data in FBI files on accepting a member of the FBI as co-author (at least if the researcher is not viewed as a friend); and (7) burying results which might be viewed as negative in the middle of a report, coupled with an unexplained disclaimer that the data cannot be used to infer the false positive error rate they seem to indicate.

*Id.*

aminers and research scientists must collaborate to conduct the most comprehensive and productive research projects.

Shortly after the NAS Committee issued its report, the National Institute of Justice (NIJ) released its first major solicitation (of \$10 million) to support basic research in forensic science.<sup>83</sup> While the NIJ's solicitation is a significant step in the right direction, much more funding is needed to ensure that only valid and reliable evidence is being used to identify, prosecute, and convict people in the criminal justice system.

### B. *Increased Oversight, Regulation, and Standards*

Twenty years ago, when DNA technology was first introduced to the criminal justice system, molecular biologist Eric Lander, made the following observation about forensic science: "At present, forensic science is virtually unregulated—with the paradoxical result that clinical laboratories must meet higher standards to be allowed to diagnose strep throat than forensic labs must meet to put a defendant on death row."<sup>84</sup> Shortly thereafter, Professor Randolph Jonakait wrote a comprehensive article on the lack of regulation in forensic science and how it led to a variety of unscientific and questionable practices in forensic science.<sup>85</sup> Jonakait also highlighted the significant error rates in forensic science. Like Lander, Jonakait questioned why forensic laboratories were immune from the significant regulations placed on clinical laboratories. Clinical labs are regulated under the Clinical Laboratory Improvement Act (CLIA) of 1988.<sup>86</sup> Congress enacted the CLIA in response to public furor about deaths attributed to false-negative Pap smear readings. After CLIA was enacted, regulated laboratories showed substantial improvement in quality assurance and accuracy.<sup>87</sup> Given the CLIA's success, Lander and Jonakait questioned why the government did not enact similar regulations for forensic laboratories.<sup>88</sup>

Twenty years later the same question still persists: why have lawmakers not enacted comprehensive regulations for forensic laboratories? Especially, when one considers the increasing number of wrongful convictions and missed opportunities of justice based on unvalidated forensic identification techniques and unqualified forensic identification examiners. The lack of oversight has led to a forensic science industry that has, at a national level: (1) no validated stan-

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83. NIJ, SOLICITATION: FUNDAMENTAL RESEARCH TO IMPROVE UNDERSTANDING OF THE ACCURACY, RELIABILITY, AND MEASUREMENT VALIDITY OF FORENSIC SCIENCE DISCIPLINES (2009).

84. Eric S. Lander, *DNA Fingerprinting On Trial*, 339 NATURE 501, 505 (1989).

85. See Randolph N. Jonakait, *Forensic Science: The Need for Regulation*, 4 HARV. J.L. & TECH. 109 (1991).

86. Clinical Laboratory Improvements Act of 1988, 42 U.S.C. § 263a (2006).

87. See Jonakait, *supra* note 86, at 173.

88. See *id.* at 191.

dards for just about every forensic identification technique; (2) no uniformity in the certification of forensic practitioners, or in the accreditation of crime laboratories; and (3) no independent entity that can adequately investigate claims of negligence, incompetence, or misconduct. As the DNA exonerations have repeatedly demonstrated, the lack of standards, independence, and oversight have resulted in far too many wrongful convictions. Congress enacted the CLIA in the wake of erroneous Pap smears that resulted in numerous preventable deaths. A similar impetus is now present in forensic science, where erroneous and unvalidated forensic science has played a significant role in numerous wrongful convictions and possibly a mistaken execution.<sup>89</sup>

### 1. National Institute of Forensic Science

The NAS Committee recognized the severe consequences of not adequately regulating the forensic science community over the last half-century. To oversee the forensic science community, and to ensure that unvalidated or erroneous forensic evidence will not contaminate the criminal process, the NAS Committee urged Congress to create an independent federal entity, the National Institute of Forensic Sciences, which would oversee forensic science.<sup>90</sup> The NAS Committee “strongly believe[d] that the greatest hope for success in [reform] will come with the creation of the [NIFS] to oversee and direct the forensic science community.”<sup>91</sup>

The responsibilities assigned to NIFS would include: (1) establishing and enforcing best practices for forensic professionals and laboratories; (2) establishing crime laboratory accreditation and examiner certification standards—which are mandatory; (3) sponsoring and encouraging peer-reviewed research; (4) determining the most practical ways to improve forensic science research; (5) allocating funds to ensure all forensic sciences are adequately supported—not just DNA testing; (6) overseeing education standards and the accreditation of forensic science programs in colleges and universities; (7) developing programs to provide guidance on the limitations of forensic techniques; and (8) determining the appropriate method for developing new technologies in the field.<sup>92</sup>

The NAS Committee made clear that NIFS must be entirely independent from the Department of Justice (DOJ)—including the FBI

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89. See Barry Scheck & Peter Neufeld, Op-Ed., *Junk Science, Junk Evidence*, N.Y. TIMES, May 11, 2001, <http://www.nytimes.com/2001/05/11/opinion/junk-science-junk-evidence.html> (“There is a model for improvement. The 1988 Clinical Laboratory Improvement Act provided accountability for laboratories that perform medical tests. A mistake in health tests can have dire results—not only for the patient, but also for the lab, which risks losing accreditation.”).

90. *NAS Report*, *supra* note 12, at 19–20.

91. *Id.* at 20.

92. *Id.* at 19–20.

laboratory and the NIJ. The Committee felt that the DOJ's mission of enforcing the law and defending the interests of the United States is too narrow to meet the growing needs of forensic science. It also concluded that the DOJ's interest could not adequately serve all forensic science consumers. Forensic science, as the Committee emphasized, "serves more than just law enforcement; and when it does serve law enforcement, it must be equally available to law enforcement officers, prosecutors, *and* defendants in the criminal justice system."<sup>93</sup> The Committee concluded that the DOJ and NIJ were "too wedded" to the status quo and "have failed to pursue a rigorous research agenda to confirm the evidentiary reliability of methodologies used in a number of forensic science disciplines."<sup>94</sup> For instance, the Committee issued a harsh assessment of the DOJ's funding strategies: "[T]he committee determined that the research funding strategies of DOJ have not adequately served the broad needs of the forensic science community . . . the committee concluded that advancing *science* in the forensic science enterprise is not likely to be achieved within the confines of DOJ."<sup>95</sup> The Committee also determined that "neither entity,"—the DOJ nor the NIJ—"has recognized, let alone articulated, a need for change [in forensic science] or a vision for achieving it,"<sup>96</sup> and concluded that they both "are not good candidates to oversee the overhaul of the forensic science community . . . ."<sup>97</sup>

The Committee identified several criteria that NIFS must meet if it is to have any chance of strengthening forensic science and developing and implementing a scientific framework in forensic science: (1) it must have a culture strongly rooted in science—not law enforcement; (2) it must not be in any way committed to the status quo or connected to a law enforcement agency; (3) it must have strong leadership in order to develop standards, conduct research, manage accreditation and testing procedures, and develop and implement rulemaking, oversight, and sanctioning processes.

To date, several forensic science organizations have voiced support for an independent federal agency such as NIFS. The American Academy of Forensic Science, for instance, "unanimously voted to support the recommendations of the NAS Report."<sup>98</sup> Likewise, the International Association for Identification (IAI) believes:

[E]ach of the forensic disciplines represented by the Association would benefit from an improved national infrastructure which pro-

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93. *Id.* at 17.

94. *Id.* at 18.

95. *Id.*

96. *Id.* at 16.

97. *Id.*

98. *The American Academy of Forensic Sciences Approves Position Statement in Response to the National Academy of Sciences' "Forensic Needs" Report*, AM. ACAD. OF FORENSIC SCI. (Sept. 4, 2009), [http://www.moiai.org/documents/AAFS\\_Position\\_Statement\\_for\\_Press\\_Distribution\\_090409.pdf](http://www.moiai.org/documents/AAFS_Position_Statement_for_Press_Distribution_090409.pdf).

vides 1) a standardized education and training program, 2) a short and long term research agenda and strategic plan, 3) standardized operating procedures, 4) enforcement mechanisms to comply with one through three, and 5) adequate funding necessary to achieve one through four and to maintain the infrastructure. Based on the aforementioned, the IAI strongly endorses and supports the *concept* behind Recommendation 1 . . . . We fully understand that the formation of such a body is not without conflicting issues but the IAI does believe that there needs to be an entity able to address those issues as highlighted in the report.<sup>99</sup>

The National Association of Medical Examiners (NAME) also “supports this recommendation and sees it as the foundation for the remainder of the NRC recommendations.”<sup>100</sup> The American Statistical Association (ASA) also endorsed the concept of an independent federal entity, but stressed that the entity must be responsible for implementing six necessary statistical practices in forensic science: (1) well-designed experiments with valid assessments and transparent error rates; (2) use of well-accepted statistical methods for data analysis; (3) rigorous peer-review of new data analysis methods; (4) modern statistical quality control and quality assurance measures; (5) double-blind proficiency testing; and (6) public availability of expert reports.<sup>101</sup>

The Author is aware that the current economic climate presents as a major barrier to creating a new independent federal agency. With that said, however, the Author still firmly believes that if a new and separate agency cannot be created to oversee forensic science, then any proposals to place the agency into an existing federal agency must be done in such a way to ensure that the culture of science is able to flourish in—or despite—the agency. In other words, grant-making decisions, research development, articulating and validating standards and techniques must remain independent and free from conflict.

## 2. State Forensic Science Commissions

Often operating with little or no oversight, crime laboratories regularly lack safeguards necessary to prevent erroneous forensic evidence from contaminating the criminal process, and most states do not have statutory guidelines regulating crime laboratories. To prevent error, therefore, each state should create an independent oversight commission to regulate and oversee its crime laboratories. These commissions should include a cross-section of people from inside and outside the forensic science establishment and other criminal justice stake-

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99. Memorandum from the Int'l Assoc. of Identification to the Hon. Patrick Leahy (Mar. 18, 2009), [www.theiaia.org/current\\_affairs/nas\\_response\\_leahy\\_20090318.pdf](http://www.theiaia.org/current_affairs/nas_response_leahy_20090318.pdf).

100. National Association of Medical Examiners, Executive Committee, *NRC Report Resolution*, Aug. 26, 2009 (resolution on file with authors).

101. *Forensic Science Endorsement*, AM. STATISTICAL ASSOC., 2–5 (May 3, 2010), [http://www.amstat.org/outreach/pdfs/Forensic\\_Science\\_Endorsement.pdf](http://www.amstat.org/outreach/pdfs/Forensic_Science_Endorsement.pdf).



holders, including prosecutors and defense attorneys with expertise in forensic evidence.

State forensic science (or oversight) commissions would, among other things, investigate allegations of misconduct and negligence. It is all too often that when misconduct surfaces at a crime laboratory or misconduct allegations are raised by the defense bar, the crime laboratory involved in the alleged misconduct attempts to police itself by conducting an internal review or audit of the examiner(s) involved in the alleged misconduct. Internal reviews, however, often fail to expose the true scope of the misconduct or negligence.

For instance, when evidence surfaced indicating that there may be significant problems with Fred Zain's work at the West Virginia State Police crime laboratory, Colonel J.R. Buckalew, the Superintendent of the West Virginia State Police, requested that the crime laboratory conduct an internal audit of Zain's work. The internal audit, "conducted by State Police Officers R.S. White and T.S. Smith, identified certain improprieties with respect to Zain's work, but concluded that 'no material inclusion or exclusion errors were made[.]'"<sup>102</sup> Colonel Buckalew, moreover, "summarized these findings to William C. Forbes, Prosecuting Attorney for Kanawha County, in a letter dated November 10, 1992, stating that, 'Based on our review of those files, we concluded that there is no need to take any further action with respect to any of Fred Zain's cases.'"<sup>103</sup> Needless to say, when independent auditors reviewed Zain's work, their conclusions differed significantly from the internal auditors. The independent auditors identified several "acts of misconduct on the part of Zain" that included:

- (1) overstating the strength of results; (2) overstating the frequency of genetic matches on individual pieces of evidence; (3) misreporting the frequency of 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.<sup>104</sup>

Likewise, in 2008 an ASCLD/LAB auditor discovered that a fiber analyst at the New York State Police crime laboratory in Albany was incompetent. The analyst, Garry Veeder, could not explain basic tasks

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102. *In re Investigation of W. Va. State Police Crime Lab., Serology Div.*, 438 S.E.2d 501, 509 (W. Va. 1993).

103. *Id.*

104. *Id.* at 503.

or perform them on a microscope. The auditor issued three serious deficiency warnings, putting the laboratory's accreditation in jeopardy. To maintain its accreditation, the state police shut down the fiber analysis subsection, and conducted an internal audit of the trace evidence section. According to a recent report by the New York Inspector General's Office, the internal auditors at the Albany crime laboratory "deliberately omitted information implicating other analysts and suggesting systemic problems with the way evidence was handled . . . . Instead, the review focused blame mostly on . . . Veeder, who committed suicide in May 2008 during the internal inquiry."<sup>105</sup> Contrary to the internal auditors' claims, the Inspector General's investigation uncovered widespread problems in supervision and training.<sup>106</sup>

The New York Inspector General's Office issued a similar report in 2007 regarding the New York City Police Department (NYPD) crime laboratory.<sup>107</sup> In March 2007, the New York State Division of Criminal Justice Services (DCJS) learned that analysts at the NYPD crime laboratory were reporting results in forensic tests without actually having performed the tests. When the Inspector General's Office investigated, it found that the NYPD's internal investigation was inadequate, and that NYPD officials failed to report its findings to accrediting bodies and the New York Forensic Science Commission.<sup>108</sup>

A few states, like Texas and New York,<sup>109</sup> have created independent forensic science commissions to investigate allegations of misconduct and negligence. Indeed, the New York Forensic Science Commission spearheaded the investigations regarding the New York State Police crime laboratory in Albany and the NYPD laboratory. As many peo-

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105. See Jeremy M. Peters, *Report Condemns Police Lab Oversight*, N.Y. TIMES, Dec. 18, 2009, <http://www.nytimes.com/2009/12/18/nyregion/18statepolice.html>.

106. According to the Inspector General's report:

The Inspector General determined that the forensic center's internal investigation inappropriately and precipitously dismissed Veeder's implication of other scientists and the deficient training he had received. The Inspector General investigated Veeder's claims and, although no conclusive evidence of dry-labbing by other scientists was unearthed, the Inspector General did determine that Veeder's allegation that he was insufficiently trained in the prescribed Becke line method specifically and fiber analysis in general was true. The Inspector General further found that Veeder's claim that his former supervisor, Anthony Piscitelli, had provided him with the reference chart to use as a crib-sheet was, as will be explained below, mostly likely accurate.

N.Y. OFFICE OF INSPECTOR GEN., REPORT OF INVESTIGATION OF THE TRACE EVIDENCE SECTION OF THE NEW YORK STATE POLICE FORENSIC INVESTIGATION CENTER 7 (DEC. 2009), <http://www.heal-online.org/peters121809.pdf>.

107. See N.Y. OFFICE OF INSPECTOR GEN., INVESTIGATION OF DRUG TEST IRREGULARITIES AT THE NYPD FORENSIC LABORATORY IN 2002 (DEC. 2007), <http://www.ig.state.ny.us/reports/reports-2007.html> (follow "Investigation of Drug Test Irregularities at the NYPD Forensic Laboratory in 2002, 12/3/07" hyperlink).

108. *Id.* at 1-5.

109. See, e.g., TEX. CODE CRIM. PROC. ANN. art. 38.01 (West Supp. 2010).

ple in Texas are well aware, the Texas Forensic Science Commission is actively investigating whether faulty arson testimony led to Cameron Todd Willingham's execution in February 2004.<sup>110</sup>

### 3. Independent Crime Laboratories

To create a culture of science in forensic science, forensic scientists must be independent and have no allegiances to law enforcement, prosecutors, defense attorneys, or the court. Cultivating independence, neutrality, and objectivity in forensic science, however, is very difficult when the "majority of forensic science laboratories are administered by law enforcement agencies . . . where the administrator reports to the head of the [law enforcement] agency."<sup>111</sup> As the U.S. Supreme Court recognized, under this configuration a "forensic analyst responding to a request from a law enforcement official may feel pressure—or have an incentive—to alter the evidence in a manner favorable to the prosecution."<sup>112</sup> The NAS Committee also determined that forensic analysts "who sit administratively in law enforcement agencies or prosecutors' offices, or who are hired by those units, are subject to a general risk of bias."<sup>113</sup>

There are several instances where forensic analysts—working for a law enforcement crime laboratory—routinely omitted information from their reports that would have undermined the prosecution's case and bolstered the defendant's case or claim of innocence.<sup>114</sup> A recent example is the North Carolina SBI crime laboratory, where SBI analysts had a long-standing policy of withholding favorable evidence from defendants.<sup>115</sup> The Houston crime laboratory audit also revealed "many instances" where analysts "fail[ed] to report analytical

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110. See Dave Montgomery, *Texas Forensic Science Commission Members at Odds Over Chairman's Comment on Willingham*, FORT WORTH STAR-TELEGRAM, Oct. 16, 2006, [http://www.star-telegram.com/2010/10/16/v-touch/2550863\\_texas-forensic-science-commission.html](http://www.star-telegram.com/2010/10/16/v-touch/2550863_texas-forensic-science-commission.html).

111. *NAS Report*, *supra* note 12, at 183.

112. *Melendez-Diaz v. Massachusetts*, 129 S.Ct. 2527, 2536, (2009).

113. *NAS Report*, *supra* note 12, at 185.

114. See MARK FURMAN, DEATH AND JUSTICE: AN EXPOSE OF OKLAHOMA'S DEATH ROW MACHINE 223 (2003) ("If [Gilchrist] were simply incompetent, her mistakes would have been all over the map. Instead, her mistakes benefited the prosecution."); Steve Mills et al., *When Labs Falter, Defendants Pay: Bias Toward Prosecution Cited in Illinois Cases*, CHI. TRIB., Oct. 20, 2004, <http://www.chicagotribune.com/news/watchdog/chi-041020forensics,0,2420336.story> ("Many forensic scientists at the state police labs, Plautz [former lab director] said, saw their role as members of the state's attorney's team. 'They thought they were prosecution witnesses,' he said. 'They didn't understand they were just scientists.'"); Ruth Teichroeb, *Crime Labs Too Beholden to Prosecutors, Critics Say*, SEATTLE POST-INTELLIGENCER, July 23, 2004, [http://www.seattlepi.com/local/183227\\_labsolutions23.html](http://www.seattlepi.com/local/183227_labsolutions23.html).

115. See N.C. DEP'T OF JUSTICE, AN INDEPENDENT REVIEW OF THE SBI FORENSIC LABORATORY (2010), <http://ncdoj.gov/getdoc/0a92ee81-0667-4935-b2d3-221d4f586c61/Independent-Review-of-SBI-Forensic-LAB.aspx>.

results that would have weakened the prosecution's case or strengthened the case for exonerating the defendant."<sup>116</sup>

Instances of pro-prosecution bias are not difficult to understand when one considers the differing objectives and missions of science and law enforcement. Law enforcement officers approach their jobs with a confirmatory mindset—i.e., they must prove or confirm that a particular person committed an offense. Scientists, on the other hand, approach their tasks with a skeptical or disconfirmatory mindset—i.e., they are trained to disprove all hypotheses before concluding whether a hypothesis is presumably valid. When these two mindsets are forced to coexist under one roof, and that roof is built and provided by a law enforcement or prosecutorial agency, it is not surprising the confirmatory mindset dominates forensic science.

To overcome these issues, and to alleviate the “[c]ultural pressures caused by the different missions of scientific laboratories vis-à-vis law enforcement agencies,”<sup>117</sup> the NAS Committee strongly urged that crime laboratories be removed from the administrative control of law enforcement agencies.<sup>118</sup> The call for independent crime laboratories is not new.<sup>119</sup> In the wake of the Fred Zain scandal, for instance, the West Virginia Supreme Court advocated independent crime laboratories.<sup>120</sup> Likewise, Governor George Ryan’s Commission Report on Capital Punishment urged Illinois lawmakers to create an independent forensic laboratory system.<sup>121</sup>

#### 4. Standards and Protocols

Nearly twenty years ago, Dr. Henry Lee made the following observation about forensic science: “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.”<sup>122</sup> Developing and enforcing standards is critical in science because a major principle of science is falsifiability through replication. Standards “provide the foundation

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116. BROMWICH, *supra* note 27, at 23.

117. NAS Report, *supra* note 12, at 184.

118. *Id.* at 24.

119. See PAUL L. KIRK & LOWELL W. BRADFORD, THE CRIME LABORATORY: ORGANIZATION AND OPERATION 22–23 (1965).

120. *In re Renewed Investigation of the State Police Crime Lab., Serology Div.*, 633 S.E.2d 762, 770 n.12 (W. Va. 2006) (“[W]e believe that removing the . . . Crime Lab from State Police Supervision and placing it under an independent agency as well as the creation of an independent supervisory board to oversee and advise the work of the Crime Lab deserves further consideration by the appropriate authorities.”).

121. See ILL. DEP’T OF CORRECTIONS, REPORT OF THE GOVERNOR’S COMMISSION ON CAPITAL PUNISHMENT 52 (2002), [http://www.idoc.state.il.us/ccp/ccp/reports/commission\\_report/chapter\\_03.pdf](http://www.idoc.state.il.us/ccp/ccp/reports/commission_report/chapter_03.pdf) (Recommendation 20: “[I]ndependent state forensic laboratory should be created, operated by civilian personnel, with its own budget, separate from any police agency or supervision.”)

122. Henry Lee, *Forensic Science and the Law*, 25 CONN. L. REV. 1117, 1124 (1993).

against which performance, reliability, and validity can be assessed.”<sup>123</sup> Adherence to standards also “reduces bias, improves consistency, and enhances the validity and reliability of results.”<sup>124</sup> Furthermore, standards “reduce variability resulting from the idiosyncratic tendencies of the individual examiner—for example, setting conditions under which one can declare a ‘match’ in forensic identifications.”<sup>125</sup> Simply put, standards “make it possible to replicate and empirically test procedures and help disentangle method errors from practitioner errors.”<sup>126</sup>

Despite the importance of standards, forensic science has yet to develop adequate and rigorous standards for determining a match and report writing. Likewise, a standard and precise vocabulary must be developed to ensure that the fact-finder is not misled to believe that an item of evidence has been individualized. Finally, forensic science has failed to develop adequate education, certification, and accreditation standards. As the *NAS Report* noted:

Although there have been notable efforts to achieve standardization and develop best practices in some forensic science disciplines and the medical examiner system, most disciplines still lack best practices or any coherent structure for the enforcement of operating standards, certification, and accreditation. Standards and codes of ethics exist in some fields, and there are some functioning certification and accreditation programs, but none are mandatory. In short, oversight and enforcement of operating standards, certification, accreditation, and ethics are lacking in most local and state jurisdictions.<sup>127</sup>

*a. Standards for Determining a Match*

Forensic science has yet to develop standards for determining when there is an association between two objects (e.g., an unknown fingerprint and a known fingerprint). The *NAS Report* found the lack of standards to be problematic: “Often there are no standard protocols governing forensic practice in a given discipline. And, even when protocols are in place (e.g., [Scientific Working Group] standards), they often are vague and not enforced in any meaningful way.”<sup>128</sup> Forensic identification examiners have operated under a system that provides guidelines, rather than validated standards. Such a system allows the greatest flexibility and discretion. Unregulated discretion, however, increases the likelihood forensic identification examiners will fail to implement the most accurate and discriminatory methods available.

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123. *NAS Report*, *supra* note 12, at 201.

124. *Id.*

125. *Id.*

126. *Id.*

127. *Id.* at 23.

128. *Id.* at 6.

Worse yet, the lack of standards enable forensic identification examiners to endorse radical and unvalidated techniques like utilizing an ultraviolet blue-light to view a five-month old bite mark and then individualizing the bite mark to a known suspect.<sup>129</sup>

*b. Report-Writing Standards*

A major scientific principle is falsifiability through replication. Replication leads to increased confidence regarding the results of an experiment. Replication, however, can only occur if scientists precisely define terms, processes, context, results, and limitations of the results and their experiment.<sup>130</sup> Consequently, "laboratory reports generated as the result of a scientific analysis should be complete and thorough. They should contain, at minimum, 'methods and materials,' 'procedures,' 'results,' 'conclusions,' and, as appropriate, sources and magnitudes of uncertainty in the procedures and conclusions (e.g., levels of confidence)."<sup>131</sup> The *NAS Report* noted that while "[s]ome forensic laboratory reports meet this standard of reporting . . . most do not."<sup>132</sup>

Inadequate technical writing and lack of documentation is most likely attributable to a particular practice in crime laboratories. According to Professor Joseph Peterson,

This practice is that of examiners not writing results in official report form unless they are informed by the prosecutor that the case is going to trial. The principle justification for his procedure is the high volume of cases to be analyzed and the time required to prepare written case report. The argument is made, 'What is the point in taking the time to prepare an official report if the case may be dismissed or may result in a guilty plea?'<sup>133</sup>

Forensic reports often fail to identify any relevant background information received and analyzed prior to the testing, the hypotheses that the testing was attempting to disprove, and the significance or limita-

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129. See Thomas J. David & Michael N. Sobel, *Recapturing a Five-Month-Old Bite Mark by Means of Reflective Ultraviolet Photography*, 39 J. FORENSIC SCI. 1560 (1994).

130. See NAS REPORT, *supra* note 12, at 113 (noting that the "key elements of good scientific practice" include "precision when defining terms, processes, context, results, and limitations").

131. *Id.* at 21; see also *id.* at 184 ("All results for every forensic science method should indicate the uncertainty in the measurements that are made, and studies must be conducted that enable the estimation of those values."); *id.* at 186 ("Forensic science reports, and any courtroom testimony stemming from them, must include clear characterizations of the limitations of the analyses, including associated probabilities where possible.").

132. *Id.* at 186.

133. Joseph L. Peterson, *Ethical Issues in the Collection, Examination, and Use of Physical Evidence*, in FORENSIC SCIENCE 41 (Geoffrey Davies, ed.) (1986).

tions with respect to the report's conclusions.<sup>134</sup> According to the *NAS Report*,

[Most] reports contain only identifying and agency information, a brief description of the evidence being submitted, a brief description of the types of analysis requested, and a short statement of the results (e.g., "The green, brown plant material in item #1 was identified as marijuana"). The norm is to have no description of the methods or procedures used, and most reports do not discuss measurement uncertainties or confidence limits.<sup>135</sup>

Moreover, laboratory reports can be misleading because they routinely omit information that is favorable to the defendant.<sup>136</sup> The North Carolina SBI laboratory, for instance, had a long-standing "practice of reporting positive results and withholding negative results, which favored the prosecution at the expense of defendants."<sup>137</sup> The SBI's policy played a direct role in Greg Taylor's wrongful murder conviction.<sup>138</sup> Other injustices have occurred and death sentences vacated because forensic analysts wrote misleading lab reports that failed to adequately and objectively define and describe terms, processes, procedures, context, and the limitations of their results and

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134. *Melendez-Diaz v. Massachusetts*, 129 S. Ct. 2527 (2009), illustrates the problem. The laboratory report in that case "contained only the bare-bones statement that '[t]he substance was found to contain: Cocaine.' At the time of trial, petitioner did not know what tests the analysts performed, whether those tests were routine, and whether interpreting their results required the exercise of judgment or the use of skills that the analysts may not have possessed." *Id.* at 2537.

135. *NAS Report*, *supra* note 12, at 186.

136. The independent audit of the Houston crime lab revealed that analysts had a tendency to report statistics for hair evidence *only* for the race of the defendant. For example, consider the hair report issued by Joseph Chu in Jorge Villanueva's 1995 capital murder trial. According to Dr. Elizabeth Johnson, Chu's analysis and report were inadequate because Chu examined and reported *only one* genetic region for each sample. According to Dr. Johnson, at least seven regions could have been examined and reported on. Furthermore, Chu presented the hair statistics with the suggestion that they originated from a Hispanic person (Villanueva is Hispanic), which Dr. Johnson called "a serious bias in reporting and testimony." For instance, while a hair match may be consistent with only 1 in 100,000 Hispanics, it may also be consistent with 1 in 20 African-Americans. As Dr. Johnson explained, to report the statistics only for Hispanics "has absolutely nothing to do with the origin of the evidence or how many people within the Houston metropolitan area could have deposited the evidence." Dr. Johnson also stressed that, by "reporting the evidence as a 'match' to the defendant and giving the defendant's frequency within his own ethnic group and no other statistics, Mr. Chu . . . potentially [misled] jurors to believe that the killer had to be Hispanic and that (Villanueva) was probably the killer." Chu also failed to report that she did not examine two pubic hairs that did not match Villanueva or the victim. See Steve McVicker & Roma Khanna, *Case Gets 2nd Look after Lab Missteps / DNA Work, Police Tactics in Question*, HOUS. CHRON., May 4, 2003, at 1.

137. Joseph Neff & Mandy Locke, *SBI Veterans Wrote and Approved Bad Blood Policy*, NEWS-OBSERVER.COM (Raleigh, N.C.), Oct. 13, 2010, <http://www.newsobserver.com/2010/10/13/737517/sbi-veterans-wrote-and-approved.html>.

138. See *id.*

techniques.<sup>139</sup> As a result, the *NAS Report* concluded that “[t]here is a critical need in most fields of forensic science to raise the standards for reporting and testifying about the results of investigations.”<sup>140</sup> In short, note-taking and documentation “are as important to the foren-

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139. The Ninth Circuit Court of Appeals commented that the California Department of Justice serologist, who provided critical testimony at Herman Atkins' rape trial, disclosed a lab report that “lacked specificity and was arguably misleading,” and that he “was not as forthcoming in explaining information as he should have been.” *Atkins v. County of Riverside*, 151 Fed. Appx. 501, 506 (9th Cir. 2005). The serologist's testimony and “misleading” lab report played a role in Atkins' wrongful rape conviction. See Fred Dickey, *Worst-Case Scenario: The Story of Herman Atkins' Years Imprisoned as an Innocent Man Might Scare the Hell Out of You. It Should*, L.A. TIMES, June 25, 2000, <http://articles.latimes.com/2000/jun/25/magazine/tm-44479>. Similarly, an “unclear and ambiguous” FBI DNA report allowed Joyce Gilchrist to falsely claim that the FBI's DNA tests in Alfred Brian Mitchell's capital murder case were inconclusive and did not rule out the possibility Mitchell deposited the semen and sperm recovered from the victim. See *Mitchell v. Ward*, 150 F. Supp. 2d 1194, 1223, 1226 (W.D. Okla. 1999), *aff'd in part, rev'd in part sub nom. Mitchell v. Gibson*, 262 F.3d 1036 (10th Cir. 2001). The FBI's DNA examinations, however, unequivocally excluded Mitchell as a possible donor of the sperm or semen. The FBI even communicated this information to Gilchrist a year before she testified. *Id.* at 1226 (“Over a year before Petitioner was tried and convicted of rape and anal sodomy, Agent Vick's DNA testing revealed that *Petitioner's DNA was not present on the samples tested.*”). The FBI's DNA analyst admitted, however, “that there [was] no way to tell from his report that: 1) he obtained no DNA profile results from the rectal swabs; 2) he obtained no DNA profile results unlike the victim for the vaginal swabs; and 3) he obtained no DNA profile results unlike the victim or Taylor for the panties.” *Id.* The DNA analyst also “testified that it is clear from the report provided to the defense that Mitchell's DNA was not revealed in the FBI testing.” *Id.* at 1226 n.46. In short, the FBI's terse DNA report failed to adequately inform Mitchell's attorneys that all DNA tests excluded Mitchell as a possible donor of the semen and sperm. *Id.* at 1226 n.45 (“[T]he defense was not aware that the FBI's DNA testing revealed the critical fact that Mitchell's DNA was not present on the samples tested.”). Moreover, the report was so “unclear and ambiguous” that another DNA expert failed to realize, like defense counsel, that all the FBI's DNA tests excluded Mitchell. *Id.* at 1227. The Tenth Circuit Court of Appeals ultimately vacated Mitchell's death sentence because of the “unclear and ambiguous” report and Gilchrist's subsequent misconduct. See *Mitchell v. Gibson*, 262 F.3d 1036, 1063 (10th Cir. 2001) (“The laboratory performed DNA testing on these items and prepared a report, which was couched in convoluted language that did not clearly recite the test results.”).

The Florida Supreme Court overturned Gerald D. Murray's first-degree murder conviction and death sentence in part because “there was a general sloppiness in documenting the [forensic] tests which even the analyst admitted was below the standards normally accepted.” *Murray v. State*, 838 So. 2d 1073, 1081 (Fla. 2002). As the Florida Supreme Court explained: “Because of the clerical errors and the below-standard documentation and paperwork, other experts who were retained by the defense were unable to adequately review the test results since necessary portions of the documentation were missing.” *Id.* Finally, Guy Paul Morin's wrongful murder conviction in Canada can be attributed in part to forensic scientists who “failed to communicate accurately the limitations of their findings to . . . the Court.” Kent Roach, *Inquiring into the Causes of Wrongful Convictions*, 35 CRIM. L. BULL. 152, 162–63 (1999).

140. *NAS Report*, *supra* note 12, at 185.



sic scientist as a proper grounding in chemistry, biology or other discipline.”<sup>141</sup>

### c. *Uniform Terminology*

Currently, there are no nationally accepted terms used “in reports and in court testimony to describe findings, conclusions, and the degrees of association between evidentiary material (e.g., hairs, fingerprints, fibers) and particular people or objects.”<sup>142</sup> Such terms, as the *NAS Report* noted, “include but are not limited to ‘match,’ ‘consistent with,’ ‘identical,’ ‘similar in all respects tested,’ and ‘cannot be excluded as the source of.’”<sup>143</sup> Forensic analysts routinely use these terms, but there is no consensus as to what these terms actually mean.<sup>144</sup> Moreover, these “weasel words”—as described by Norah Rudin and Keith Inman—allow forensic analysts to circumvent “their responsibility of crafting a statement that conveys their conclusions as accurately as possible.”<sup>145</sup> This “imprecision in vocabulary stems in part from the paucity of research in forensic science and the corresponding limitations in interpreting the results of forensic analyses.”<sup>146</sup> The *NAS Report* stressed that many forensic science disciplines “critically need to standardize and clarify the terminology used in reporting and testifying about the results and in providing more information.”<sup>147</sup> Precisely defining these terms is vital because, as the *NAS Report* explained, “such terms can have a profound effect on how the trier of fact in a criminal or civil matter perceives and evaluates evidence.”<sup>148</sup>

Consequently, forensic science must establish a uniform language that must minimize—or altogether eliminate—the use of the terms *match* and *consistent with* because both misleadingly characterize the connection between an impression or mark and a source.<sup>149</sup> The *NAS*

141. John I. Thornton & Joseph L. Peterson, *The General Assumptions and Rationale of Forensic Identification*, in *MODERN SCIENTIFIC EVIDENCE: FORENSICS* 22 (David L. Faigman et al. eds. 2006).

142. *NAS Report*, *supra* note 12, at 185.

143. *Id.* The *NAS Report* also noted that “the forensic science disciplines have not reached agreement or consensus on the precise meaning of any of these terms.” *Id.* at 185–86.

144. See KEITH INMAN & NORAH RUDIN, *PRINCIPLES AND PRACTICE OF CRIMINALISTICS: THE PROFESSION OF FORENSIC SCIENCE* 281 (2000) (explaining that forensic analysts “don’t agree among themselves about the intended meaning of several commonly used phases . . .”).

145. *Id.*

146. *NAS Report*, *supra* note 12, at 186.

147. *Id.* at 189.

148. *Id.* at 185.

149. See HON. F. KAUFMAN C.M., Q.C., *THE COMMISSION ON PROCEEDINGS INVOLVING GUY PAUL MORIN* (1998):

The difficulty in the term ‘match’ needs little elaboration. . . . It overstates the connection between similar [forms of evidence]. There are multiple difficulties presented by the use of the term ‘consistent with.’ First, some use

*Report*, for instance, concluded that the terms *match* or *consistent with* are routinely “misunderstood to imply individualization,”<sup>150</sup> and individualization, as the NAS Committee concluded, is not possible in any of the non-DNA forensic identification fields. Professor Ian Freckelton, the Commissioner who headed Edward Splatt’s wrongful conviction inquiry in Australia, was particularly concerned with how the forensic identification examiners manipulate the term *consistency*. According to Professor Freckelton,

Another problem during the trial, upon which the Commissioner focused, was the language that several of the scientists employed. The defense did not adequately cross-examine the scientists as to the precise meaning of the words they used. For example, a number of the prosecution’s scientific witnesses stated that items ‘are not inconsistent with having come from the same source as the control sample.’ The Commissioner noted that to scientists an expression of ‘consistency’ has a clear scientific connotation, but stressed that, in the forensic context, the concentration was not on views passing among, and confined to, scientists. He pointedly commented that the views given were not advanced in the halls of academia or at the benches of laboratories—but ‘were opinions expressed to a lay jury, which had been clearly told that . . . the scientific evidence was of prime importance.’ Even more significantly, from the Commissioner’s point of view, the jury had been told that the critical question to be determined by the jury was whether the relevant trace materials had come from the same source. That being the core of the problem so far as the jurors were concerned, the Commissioner expressed the view that the use by scientific witnesses of certain expressions (‘consistent with having a common origin’ or ‘consistent with them coming from the same source’) was an ‘extremely dangerous exercise.’<sup>151</sup>

Historically, as the terms *match* and *consistent with* indicate, forensic terminology has been constructed from an inclusionary perspective, driven by the need for certainty in the legal system. It is suggested that the uniform code be restructured from an exclusionary

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the term interchangeably with ‘could have’ originated or ‘cannot be excluded’ as originating. The term is now shroud in confusion. . . . Second, the term ‘consistent with’ may be used by forensic scientists in other disciplines to mean something different. . . . Third, . . . ‘consistent with’ in common parlance would extend to anything which is not inconsistent with . . . . Fourth, . . . ‘consistent with’ implies perfect or near identity of two items.

*Id.* at 341–42.

150. NAS REPORT, *supra* note 12, at 161. For instance, Norah Rudin and Keith Inman had this to say about the term *match*: “[Because forensic] scientists have not explicitly stated which definition [they] mean to imply, and the word, as commonly used, has multiple definitions, the situation simply begs for misunderstanding and misuse.” See also INMAN & RUDIN, *supra* note 143, at 283.

151. Ian Freckelton, *Judicial Attitudes Toward Scientific Evidence: The Antipodean Experience*, 30 U.C. DAVIS L. REV. 1137, 1160–61 (1997) (citing CARL SHANNON, ROYAL COMMISSION REPORT CONCERNING THE CONVICTION OF EDWARD CHARLES SPLATT 38 (1984)).

point of view, so forensic identification examiners can articulate their conclusions in terms of their ability to exclude rather than their ability to include.<sup>152</sup> The rationale against using an inclusionary framework is supported by another strong consideration—these terms encourage forensic identification examiners to seek out similarities or consistencies between various pieces of evidence rather than dissimilarities. Science is premised on differentiating between competing results not identifying similarities.

## 5. Laboratory Accreditation

The *NAS Report* called for the mandatory accreditation of crime labs.<sup>153</sup> Currently, accreditation is mostly voluntary. While many public crime laboratories are accredited, many forensic units within police agencies still remain unaccredited.<sup>154</sup> As the National Academies 1992 DNA Report commented, “[v]oluntary accreditation programs are not enough. Because professional organizations, such as ASCLD-LAB, lack regulatory authority, forensic laboratories could avoid accreditation and still offer DNA typing evidence in criminal proceedings.”<sup>155</sup> New York mandated accreditation in 1994.<sup>156</sup> Texas and Oklahoma followed suit after major crime laboratory scandals surfaced in both states.<sup>157</sup> Maryland recently made crime laboratories subject to the same regulations as clinical laboratories under the Maryland Department of Health and Mental Hygiene.<sup>158</sup>

As the North Carolina SBI laboratory scandal makes clear, however, accreditation will only work if the accrediting body thoroughly inspects a crime laboratory before accrediting the laboratory and the methods that are endorsed have a solid scientific underpinning. The

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152. See MORIN INQUIRY, *supra* note 148, at 344–45.

153. See *NAS Report*, *supra* note 12 at 25.

154. See Graham R. Jones, *President's Editorial — The Changing Practice of Forensic Science*, 47 J. FORENSIC SCI. 437, 438 (2002) (“Unfortunately, while the ASCLD/LAB program has been successful in accrediting over 200 laboratories, a large number of forensic laboratories in the U.S. remain unaccredited by any agency.”).

155. NAT'L RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE 106 (1992).

156. N.Y. EXEC. LAW § 995b (Consol. Supp. 2011) (requiring accreditation by the state Forensic Science Commission); see also CAL. PENAL CODE § 297 (West 2008) (requiring accreditation of DNA units by ASCLD/LAB or any certifying body approved by ASCLD/LAB); MINN. STAT. ANN. § 299C.156(2)(4) (West 2007) (specifying that Forensic Science Advisory Board should encourage accreditation by ASCLD/LAB or other accrediting body).

157. See TEX. CODE CRIM. PROC. ANN. art. 38.35 (West Supp. 2010) (requiring accreditation by the Department of Public Safety). Texas also created a Forensic Science Commission. TEX. CODE CRIM. PROC. ANN. art. 38.01 (West Supp. 2010); see also OKLA. STAT. ANN. tit. 74, § 150.37 (West Supp. 2010) (requiring accreditation by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) or the American Board of Forensic Toxicology).

158. See Brian Witte, *Md. Puts Teeth in Bill to Regulate Crime Labs*, WTOPNEWS.COM (May 7, 2007), <http://www.wtop.com/?nid=25&sid=1134411>.

American Society of Crime Lab Directors/Laboratory Accreditation Board (ASCLD/LAB)—the most recognized accrediting body in forensic science—accredited the SBI laboratory for more than twenty years (since 1988). ASCLD/LAB, however, missed numerous errors and overlooked obvious unscientific practices at the SBI laboratory year-after-year. In 2010, in the wake of Gregory Taylor’s wrongful murder conviction, the North Carolina Attorney General retained two independent auditors to review the work of the Forensic Biology Section of the SBI Laboratory. The auditors repeatedly identified the errors and unscientific practices that ASCLD/LAB overlooked or missed.<sup>159</sup> Chris Swecker, a former FBI assistant director and one of the independent auditors, said: “It was surprising to me that [ASCLD/LAB] didn’t get a better sense of what was going on in the lab all those years.”<sup>160</sup> Swecker’s audit “revealed that eight analysts over 16 years failed to report the results of more sophisticated tests that had undermined their initial findings.”<sup>161</sup> This policy, which was sanctioned by laboratory supervisors, affected at least 230 cases—including Gregory Taylor’s case. ASCLD/LAB’s failure to spot such easily identifiable errors and problems can possibly be explained by the relationship between the SBI laboratory and ASCLD/LAB, as the latter is headed by two former SBI agents: Ralph Keaton and John Neuner.<sup>162</sup>

Several other agencies accredited by ASCLD/LAB have had problems in recent years. For instance, despite the lack of oversight and training at the New York State Police crime laboratory in Albany,<sup>163</sup> the laboratory is still accredited by ASCLD/LAB. Similarly, ASCLD/LAB accredited the San Francisco police crime laboratory in 2005. In February 2009, ASCLD/LAB extended that accreditation for six months despite finding that the laboratory was short on staff, used outdated equipment and testing procedures, and had inconsistent record-keeping. It also discovered a family of feral cats living at the laboratory.<sup>164</sup> In March 2009, San Francisco police shut down the laboratory’s drug unit after an analyst was arrested for stealing drugs.<sup>165</sup> Lastly, in 2008 the Baltimore Police Department fired the director of its crime lab because forensic analysts had been contaminating evi-

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159. See Mandy Locke & Joseph Neff, *Inspectors Missed All SBI Faults*, NEWS & OBSERVER (Raleigh, N.C.), Aug. 27, 2010, <http://www.newsobserver.com/2010/08/26/648075/inspectors-missed-all-sbi-faults.html>.

160. *Id.*

161. See *id.*; see also N.C. DEP’T OF JUSTICE, AN INDEPENDENT REVIEW OF THE SBI FORENSIC LABORATORY (2010).

162. Locke & Neff, *supra* note 158.

163. See N.Y. OFFICE OF INSPECTOR GEN., *supra* note 105, at 11–13.

164. See Shoshana Walter, *In Scandal’s Wake, Police Turn to Quick, Cheap Test for Drugs*, N.Y. TIMES, Aug. 27, 2010, <http://www.nytimes.com/2010/08/27/us/27bcdrug.html>.

165. See *id.*

dence with their own DNA for years, unbeknownst to supervisors.<sup>166</sup> The laboratory had never entered the DNA profiles of employees into its database, a standard practice for laboratories to detect contaminated tests. Ralph Keaton, head of ASCLD/LAB, said at the time that maintaining an employee database was not a requirement for accreditation, but was so fundamental that not doing so was unheard of. Despite this “fundamental” shortcoming ASCLD/LAB still accredited the laboratory.

While ASCLD/LAB has much to recommend in terms of standards and regulations, it falls short by lacking certain important requirements including: independence from law enforcement and prosecutorial agencies, mandatory blind proficiency testing, and procedures to prevent and minimize contextual and examiner bias. Another obvious conflict is that ASCLD/LAB is funded by the very laboratories it accredits and, thus, rarely rejects an applicant or disciplines a member laboratory when misconduct occurs. As one forensic critic put it, becoming accredited “is akin to getting a mail-order diploma. If you have the money, they have the accreditation.”<sup>167</sup>

## 6. Examiner Certification

While laboratory accreditation is critical, such an endorsement merely represents an institutional credential. Science, however, is performed by individual scientists and *not* institutions. Because scientists are those performing the science another way to minimize errors and ensure competency is to frequently gauge the examiner’s proficiency. In short, lawmakers and forensic science must make certification mandatory. In other words, before an analyst can perform forensic examinations, he or she must be nationally or locally certified by NIFS or their respective state’s forensic science commission.

Professional competency is typically determined by some recognized set of standards. For instance, many professions, even those where one’s life or liberty is not at stake, require their members to be licensed or certified.<sup>168</sup> This is not the case in forensic science because “most jurisdictions do not require forensic practitioners to be certified, and most forensic science disciplines have no mandatory certification programs.”<sup>169</sup> Consequently, the forensic examiner’s com-

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166. See Julie Bykowicz, *Dubious Science: Carelessness in Crime Lab Procedures Raises Serious Questions About Evidence*, BALT. SUN, Sept. 7, 2008, [http://articles.baltimoresun.com/2008-09-07/news/0809050086\\_1\\_crime-lab-lab-employees-dna](http://articles.baltimoresun.com/2008-09-07/news/0809050086_1_crime-lab-lab-employees-dna).

167. *Id.* (quoting Patrick Kent, forensics division chief of the Maryland public defender’s office).

168. See NAS Report, *supra* note 12 at 208 (“In other realms of science and technology, professionals, including nurses, physicians, professional engineers, and some laboratorians, typically must be certified before they can practice.”).

169. *Id.* at 6; see Peterson, *supra* note 132, at 42 (“Unlike most other scientific professions, the criminalistics . . . field is without procedures to assess and recognize member of the profession who have satisfied minimum criteria for practicing in their

petency has routinely been gauged by two non-science individuals: judges and jurors. Judges decide whether an examiner is qualified to testify as an expert, while jurors decide whether the expert's testimony is credible. Under this system, then, "courts are required to accept or reject the expert's own claims of expertise, or that of his employer, without the benefit of an impartial and rigorous assessment of his or her capabilities."<sup>170</sup> As the NAS Committee stressed, a "case-by-case adjudicatory approach . . . is not well suited to address the systematic problems in many of the various forensic science disciplines. Judicial review, by itself, will not cure the infirmities of the forensic science community."<sup>171</sup> The lack of mandatory certification programs is disconcerting because the "quality and relevance" of undergraduate and graduate forensic science programs is "uncertain."<sup>172</sup> The NAS Committee, for instance, found that current and past forensic science programs have not adequately trained students on the fundamental practices of science and the scientific method:

To correct some of the existing deficiencies, it is crucially important to improve undergraduate and graduate forensic science programs. The legitimization of practices in the forensic science disciplines must be based on established scientific knowledge, principles, and practices, which are best learned through formal education.<sup>173</sup>

Forensic examiners have historically resisted certification programs, even voluntary ones.<sup>174</sup> This is disconcerting given the nature and importance of the work being performed. In light of the DNA exoneration, moreover, forensic science can no longer assume forensic analysts are competent—even experienced examiners. Instead, forensic science must continually verify the competence and accuracy of forensic examiners. As a result, the NAS Committee recommended that certification requirements must "include, at a minimum, written examinations, supervised practice, proficiency testing, continuing edu-

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forensic specialty. The profession has no minimum criteria for education and training requirements, experience, or performance on written or practical examinations"); *accord* State v. Quintana, 2004 UT App 418, ¶ 13, 103 P.3d 168 (Thorne, J., concurring) ("[M]ost evidence points to a lack of consistent training of [fingerprint] examiners and an absence of any nationally recognized standard to ensure that examiners are equipped to perform the tasks expected of them.").

170. See Joseph L. Peterson & John E. Murdock, *Forensic Science Ethics: Developing an Integrated System of Support and Enforcement*, 34 J. FORENSIC SCI. 749, 750–51 (1989).

171. *NAS Report*, *supra* note 12, at 110.

172. *Id.* at 237 ("It appears that there are no formal and systematically applied standards or standardization requirements for forensic science education programs, making the quality and relevance of existing programs uncertain.").

173. *Id.* at 238.

174. See INMAN & RUDIN, *supra* note 143, at 308–09 (discussing the history of certification in the forensic community).

cation, recertification procedures, adherence to a code of ethics, and effective disciplinary procedures.”<sup>175</sup>

## 7. Mandatory Blind Proficiency Testing

Forensic analysts are bound to make errors, “[a]ny forensic scientist who believes [otherwise] . . . will suffer treble recompense for their arrogance.”<sup>176</sup> Regardless of their exact causation, errors must be accounted for and minimized. Proficiency testing is the most effective way to calculate error rates.<sup>177</sup> Identifying error rates in forensic science has caused a great deal of anxiety for forensic analysts, causing many of them to dislike proficiency testing.<sup>178</sup> Although many analysts loathe proficiency testing, lawmakers and forensic science must make proficiency testing mandatory. Voluntary testing programs provide inadequate data to gauge an analyst’s true accuracy and proficiency.<sup>179</sup> More importantly, even though crimes laboratories have traditionally opposed blind proficiency testing,<sup>180</sup> such testing must be blindly conducted.<sup>181</sup> There are two forms of proficiency testing—open [or declared] and blind. In open proficiency testing examiners are aware of when they are being tested.<sup>182</sup> In blind testing, on the other hand, analysts are not aware they are being tested.<sup>183</sup> Many argue that open proficiency testing does not accurately capture an examiner’s accuracy because examiners devote added attention to test samples because they know they are being graded.<sup>184</sup> To support their claim, the critics point to the number of analysts who have testified in court that they have never made a mistake in a single proficiency

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175. See Peterson & Thornton, *supra* note 140, at 19.

176. See Peterson & Thornton, *supra* note 140, at 19.

177. See Joseph L. Peterson et al., *The Feasibility of External Blind DNA Proficiency Testing. I. Background and Findings*, 48 J. FORENSIC SCI. 21, 24 (2003) (“Participation in a proficiency testing program is a critical element of a successful [quality assurance] program and is an essential requirement for any laboratory performing forensic DNA analysis.”).

178. See Peterson & Thornton, *supra* note 140, at 20.

179. See Health Care Financing Administration’s Management of Medical Laboratories: Hearing on S. 765 Before the Subcomm. on Oversight of Government Management of the S. Comm. on Governmental Affairs, 100th Cong. \_\_\_\_ (1988) (statement of Herbert W. Dickerman) (“Numerous reports in the literature have demonstrated that voluntary proficiency testing simply does not perfect laboratory performance as well as a mandatory program does.”).

180. Barry C. Scheck, *DNA and Daubert*, 15 CARDOZO L. REV. 1959, 1997 (1994) (“[F]orensic laboratories have historically resisted external blind proficiency testing and other efforts to assess laboratory error rates.”).

181. As Professor Jonakait mentioned a decade ago, “The important issue for criminal justice is not how accurately laboratories perform when they are aware of being tested, but how well they do on actual cases.” Jonakait, *supra* note 84, at 184.

182. See Peterson et al., *supra* note 176.

183. See *id.*

184. See *id.*

test.<sup>185</sup> Blind proficiency testing provides a truer assessment of an examiner's accuracy because examiners will not have the opportunity to consciously devote added attention to the test specimen.<sup>186</sup> Numerous studies have repeatedly demonstrated that blind testing resulted in lower accuracy rates and higher false negatives rates.<sup>187</sup> Moreover, all proficiency testing must be made public. When proficiency tests are conducted the results are normally not disclosed to the public. This is unacceptable because secrecy and science are incompatible. In the end, if forensic science intends to strengthen its scientific foundation, it "must not be to deny error, but to learn from it, avoiding the stability it gets from repetition."<sup>188</sup>

### III. CONCLUSION

Forensic science has been an invaluable tool for law enforcement and the criminal justice system for well over a century. Countless crimes have been solved because of advancing forensic technology. Solving crimes brings justice to the victims and their families and protects the public by removing violent criminals from the streets. While solving crime is a compelling governmental interest, it cannot be the end all. Instead, the criminal justice system must always ensure that it prosecutes and convicts the truly guilty—and not the innocent. Over the last two decades, though, it has become painfully obvious that forensic science does not always identify the truly guilty. There are numerous reasons why forensic science has been linked to so many wrongful convictions. The primary reasons—from the author's perspective—are inadequate funding, inadequate regulation, and inadequate oversight. To protect the innocent and to accurately identify the guilty, forensic science must be properly funded, well regulated, and have entities in place that can adequately oversee forensic science and investigate allegations of misconduct or negligence. In the end, the ultimate objective should be to develop a culture of science in forensic science so we can minimize the likelihood of convicting the innocent, while at the same time not compromise law enforcement's and the prosecution's ability to identify, apprehend, and prosecute the truly guilty.

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185. See, e.g., *United States v. Lewis*, 220 F. Supp. 2d 548, 553 (S.D. W. Va. 2002) ("The laboratory where Mr. Cawley works submits each [document] examiner to a proficiency test year, which it administers, and since 1989, Mr. Cawley's passage rate has been 100%."); *Williams v. State*, 795 So. 2d 753, 770 (Ala. Crim. App. 1999) ("[DNA analyst] Huys testified that he was not aware of any errors that had occurred in any of the DNA testing performed in the department's laboratory."), *aff'd sub nom. Ex parte Williams*, 795 So. 2d 785 (Ala. 2001); *Hughes v. State*, No. 97-DP-00028-SCT (¶147) (Miss. 1999) (noting how the State's DNA analyst undertook "proficiency tests and . . . scored 100% accuracy").

186. See Peterson et al., *supra* note 176.

187. See *id.*

188. ROBERT ROSENTHAL, *EXPERIMENTER EFFECTS IN BEHAVIORAL RESEARCH* 5 (New York, Appleton-Century-Crofts 1966) (citation omitted).