

CHAPTER 5

FORENSIC SCIENCE

THE ISSUE

Unvalidated or improperly applied forensic science contributed to approximately half of the 265 wrongful convictions overturned by post-conviction DNA testing,¹ leading to serious questions about the reliability of forensic analyses that the police and legal system use to determine innocence or guilt. In the landmark 2009 report, *Strengthening Forensic Science in the United States: A Path Forward*, the National Academy of Sciences recommended additional research and development of forensic science based on their finding that the validity and reliability of certain non-DNA forensic techniques had not yet been proven.² To accomplish the NAS report's goals, researchers must conduct more rigorous studies of non-DNA forensic techniques³, Congress must implement national standards based on this research, and the Department of Justice (DOJ) must oversee the system to ensure compliance and enforcement.

HISTORY OF THE PROBLEM

At its best, forensic science can help identify the perpetrator of a crime and help prevent the innocent from being wrongfully convicted. At its worst, it is the second-greatest contributing factor to wrongful convictions.⁴ As a consequence, not only are innocent individuals imprisoned but dangerous criminals remain free, posing significant risks for public safety. Indeed, those identified as the true perpetrators by post-conviction DNA testing have, as a group, been convicted of at least 81 violent crimes committed while free because of faulty forensic techniques.⁵ All of these later crimes occurred while the innocent person was either imprisoned or identified as the prime suspect in the criminal investigation.⁶

¹ See The Innocence Project, <http://www.innocenceproject.org> (last visited Jan. 10, 2011).

² NAT'L RESEARCH COUNCIL, NAT'L ACADEMY OF SCIENCES, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* 42 (2009) (hereinafter NAS Report), at 8.

³ The NAS report discusses a selected number of forensic science disciplines in Ch. 5 of the report. Forensic science disciplines such as "DNA analysis, serology, forensic pathology, toxicology, chemical analysis, and digital and multimedia forensics – are built on solid bases of theory and research, many other techniques have been developed heuristically. That is, they are based on observation, experience, and reasoning without an underlying scientific theory, experiments designed to test the uncertainties and reliability of the method, or sufficient data that are collected and analyzed scientifically." (p. 128) Among the non-DNA forensic disciplines that fall under the "heuristic" category are: friction ridge analysis, pattern/impression evidence such as shoeprints and tire tracks, tool mark and firearms identification, analysis of hair evidence, analysis of fiber evidence, questioned document examination, forensic odontology, and bloodstain pattern analysis. Other forensic disciplines that require more fundamental research include analysis of paint and coatings evidence and the analysis of explosives evidence and fire debris.

⁴ See The Innocence Project, *Unvalidated or Improper Forensic Science*, <http://www.innocenceproject.org/understand/Unreliable-Limited-Science.php> (last visited Jan. 10, 2011).

⁵ Innocence Project internal statistics for first 254 DNA exonerations. On file with author. <http://www.innocenceproject.org/about/Contact-Us.php>.

⁶ *Id.*

In contrast to post-conviction DNA testing, which has been thoroughly studied and subjected to the rigors of scientific peer review, other forms of forensic science continue to have glaring and persistent deficiencies. Because DNA is only available in 5 to 10 percent of violent crimes,⁷ it is imperative that Congress and the Administration address these scientific shortfalls. With this in mind and pursuant to the Justice for All Act of 2004 (JFAA), Congress and President Bush directed the National Academy of Sciences (NAS) to examine the fundamental underpinnings of forensic scientific evidence and its application to the criminal justice system. In February 2009, the NAS issued the report, *Strengthening Forensic Science in the United States: A Path Forward*.⁸

In the report, the NAS concluded that there is an insufficient scientific foundation for many non-DNA forensic science disciplines, and recommended establishing limits for their use and measures of performance where they are lacking.⁹ The NAS also described the United States forensic system as fragmented and lacking a means through which to foster forensic science advancements.¹⁰ Consequently, there is wide variability in the practice of forensic methods, laboratory capacity, oversight, staffing, certification of forensic practitioners, and accreditation of crime laboratories.¹¹ The NAS report recommended a number of changes that would make forensic science as reliable as life and physical sciences, and ensure that forensic science is applied scientifically, consistently, and fairly in the legal system.¹² The primary recommendation of the NAS report is the creation of a National Institute of Forensic Science (NIFS).¹³ The NAS envisions NIFS as an independent, science-based federal agency with strong ties to the forensic science community, but not committed in any way to the current law enforcement system.¹⁴

While the National Institute of Justice (NIJ) has been the center of forensic science funding, it did not begin to support forensic science research at the levels required until after the release of the NAS report. Moreover, NIJ's research was based on the mistaken assumption that the forensic techniques in question were valid. Furthermore, a 2010 NAS report evaluating NIJ's research program found that the agency allows practitioners to drive research funding practices, further calling into question NIJ's research and conclusions.¹⁵

Recent Congressional hearings on forensic science have focused on identifying an oversight body to coordinate research, standardize forensic techniques, and apply a more scientific framework to the field.¹⁶ Members of Congress expressed skepticism about the notion of a NIFS.

⁷ GARDNER AND ANDERSON, *CRIMINAL EVIDENCE: PRINCIPLES AND CASES*, Seventh Addition (2010), at 271.

⁸ NAS Report, *supra* note 2.

⁹ NAS Report, *supra* note 2, at 7-8.

¹⁰ NAS Report, *supra* note 2, at 14.

¹¹ NAS Report, *supra* note 2, at 14-18.

¹² NAS Report, *supra* note 2, at 19-33.

¹³ NAS Report, *supra* note 2, at 19.

¹⁴ *Id.*

¹⁵ NATIONAL ACADEMY OF SCIENCES, *STRENGTHENING THE NATIONAL INSTITUTE OF JUSTICE* (2010).

¹⁶ *Strengthening Forensic Science in the United States: the Role of the National Institute of Standards and Technology: Hearing Before the Subcomm. on Technology and Innovation of the H. Comm. on Science and*

However, the responsibilities of NIFS can be implemented using existing federal agencies in roles that are in line with their missions to bring the foundation of non-DNA forensic sciences more closely in line with other scientific disciplines and make the U.S. a market leader in forensic science technology. To ensure impartial funding, development, implementation and oversight of forensic science, the National Science Foundation (NSF) should provide research funding, and the National Institute for Standards and Technology (NIST) should develop standards for forensic science methods and practice. Further, if the DOJ is to oversee accreditation of laboratories, certification of forensic practitioners, compliance, and enforcement, lawmakers must ensure transparency and complete independence from the Department's law enforcement function.

The Senate Judiciary, House Judiciary, and House Science & Technology Committees have demonstrated interest in reforming forensic science in the wake of the NAS report. The House Committee on Science & Technology's Subcommittee on Technology and Innovation held a hearing on March 10, 2009, less than one month after the release of the report, to discuss the role of NIST in addressing the NAS report's recommendations. The next week, on March 18, 2009, the Senate Judiciary Committee held a hearing inviting the report's co-chair, Judge Harry T. Edwards, to discuss its recommendations. On May 13, 2009, the House Judiciary Committee's Subcommittee on Crime, Terrorism, and Homeland Security held a hearing to gain a similar general understanding of the report. On September 9, 2009, the Senate Judiciary Committee then held a second hearing to examine the report's recommendations with a broad array of criminal justice stakeholders.

Further, The White House Office of Science and Technology Policy has chartered a Subcommittee on Forensic Science under the National Science and Technology Council, which convenes a group of federal agencies with an interest in forensic science. Its role is to deliberate on how immediate Executive Branch actions might address the NAS report's recommendations and lay the groundwork for Congressional legislation.

The U.S. has already demonstrated that it can lead in the field of forensic science. Under President Bush, the United States both funded and supported the use of forensic DNA technology. This investment made the U.S. the world leader in DNA technology, while also creating public and private sector jobs. One example is the success of Bode Technology, one of the world's largest forensic DNA analysis firms. In 2010, it sold more than 3.5 million units of a DNA collection device and achieved its greatest sales ever, even in a struggling economy.¹⁷ Because fingerprint and

Technology, 111th Cong. (2009); *The Need to Strengthen Forensic Science in the United States: The National Academy of Science's Report on a Path Forward: Hearing Before the S. Comm. on the Judiciary*, 111th Cong. (2009); *The National Research Council's Publication "Strengthening Forensic Science in the United States: A Path Forward": Hearing Before the Subcomm. on Crime, Terrorism, and Homeland Security of the H. Comm on the Judiciary*, 111th Cong. (2009); *Strengthening Forensic Science in the United States: Hearing Before the S. Comm. on the Judiciary*, 111th Congress (2009).

¹⁷*Bode Technology Surpasses Sales Mark of 3.5 Million Buccal DNA Collectors, Expands With New Global And Domestic Territories*, MARKET WATCH, Nov. 12, 2010, available at: http://www.marketwatch.com/story/bode-technology-surpasses-sales-mark-of-35-million-buccal-dna-collectors-expands-with-new-global-and-domestic-territories-2010-11-12?reflink=MW_news_stmp.

firearms toolmarks are collected for use in criminal cases as frequently as DNA,¹⁸ a forensic system supported by robust research could open more new market opportunities. Such an investment, especially at this early stage, could yield commercial benefits and help maintain the U.S. leadership position in forensic science technology.

¹⁸ PETERSON, ET AL., THE ROLE AND IMPACT OF FORENSIC EVIDENCE IN THE CRIMINAL JUSTICE PROCESS, GRANT REPORT, NCJ 231977 (2010), *available at*: <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/29203>.

RECOMMENDATIONS

1. Nurturing Forensic Science To Increase Public Safety and Access to Justice

A. *Non-DNA Forensic Science Requires Additional Research and Support*

Non-DNA forensic science lacks the foundational research, reliability and the national standards that characterize DNA forensics. Researchers must conduct more rigorous studies of non-DNA forensic disciplines to increase their validity and reliability. This research must be used, in turn, to set national standards for how to handle forensic evidence, and establish appropriate enforcement and compliance measures to ensure that forensic sciences can be applied accurately, consistently, and fairly in our legal system.

B. *Coordinate Federal Agencies to Create a Scientific Forensic Solution*

Legislative

Congress should continue to focus on forensic science reform, starting with taking steps toward improving the accuracy of forensic science. As a starting point, Congress should assign responsibility for funding research to the NSF and should direct NIST to use the NSF research to set national standards for the use of forensic methods. Congress should also direct the DOJ to oversee accreditation of laboratories, certification of forensic practitioners, compliance, and enforcement. Funding to support development and marketing new technologies should be distributed through NIST as well.

Executive

The executive branch should direct the NSF to develop a research agenda for forensic science. Additionally, the executive branch should direct NIST to develop a model laboratory report and model terminology for testimony to help make forensic services uniform and transparent to the courts. NIST should also consider other opportunities to address the need for uniform forensics-related standards where a body of research is sufficient.

DOJ could also support transparency by reinforcing the Congressional intent of the Paul Coverdell Forensic Science Improvement Grant Program. To accomplish this goal, the Office of Justice Programs (OJP) should provide better guidance to applicants about naming a qualified independent external government entity to conduct investigations under the Coverdell program's forensic oversight requirements. Additionally, OJP should make it easier for forensic employees, criminal justice practitioners and members of the public to file allegations of forensic negligence or misconduct and make sure labs are referring allegations to their investigative entities; and investigations taking place subsequent to the filing of allegations should be monitored to confirm the thoroughness and independence of investigations.

Judicial

Few judges across the country, especially those at the trial level, are aware of the NAS report or its implications. As gatekeepers of scientific evidence, it is imperative that local, state and federal judges receive adequate training on the NAS report and judicial decisions on the admissibility and treatment of forensic evidence in criminal courts. To this end, federal funding must be made available to judicial organizations to coordinate and conduct such trainings.

APPENDICES

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Further Resources

COMMITTEE ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCES COMMUNITY, NATIONAL RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD, (National Academy of Sciences, Aug. 2009). *Available at* <http://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf>.

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