# STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: THE ROLE OF THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

## HEARING

BEFORE THE

SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION

COMMITTEE ON SCIENCE AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

MARCH 10, 2009

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# STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: THE ROLE OF THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

**TUESDAY, MARCH 10, 2009**

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
*Washington, DC.*

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 2318 of the Rayburn House Office Building, Hon. David Wu [Chair of the Subcommittee] presiding.

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

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**Subcommittee on Technology and Innovation's**

Hearing on

***STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: THE ROLE OF THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY***

Tuesday, March 10, 2009
10:00a.m. – 12:00p.m.
2318 Rayburn House Office Building

**Witness List**

**Mr. Pete Marone**
*Director of Technical Services at Virginia Department of Forensic Science*

**Ms. Carol Henderson**
*Director of the National Clearing House for Science, Technology and the Law; Professor of Law, Stetson University College of Law; Past President, the American Academy of Forensic Sciences*

**Mr. John Hicks**
*Director, Office of Forensic Services, New York State Division of Criminal Justice Services (Retd.), and former Director, FBI Laboratory*

**Dr. J.C. Upshaw Downs**
*Coastal Regional Medical Examiner, Georgia Bureau of Investigation*

**Mr. Peter Neufeld**
*Co-founder and Co-Director, The Innocence Project*

HEARING CHARTER

# SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION
# COMMITTEE ON SCIENCE AND TECHNOLOGY
# U.S. HOUSE OF REPRESENTATIVES

# Strengthening Forensic Science in the United States: The Role of the National Institute of Standards and Technology

TUESDAY, MARCH 10, 2009
10:00 A.M.—12:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

## I. Purpose

On Tuesday, March 10, 2009, the Subcommittee on Technology and Innovation will convene a hearing to review the scientific and technical issues raised by the recently released National Academies report *Strengthening Forensic Science in the United States: A Path Forward.* The hearing will discuss issues related to the accuracy, standards, reliability, and validity of forensic science, as well as how the expertise of the National Institute of Standards and Technology (NIST) in forensics related research, developing standards and certified test methodologies, and performing laboratory accreditation may be leveraged to implement some of the recommendations in the report.

## II. Witnesses

**Mr. Pete Marone** is the Director of Technical Services at the Virginia Department of Forensic Science.

**Ms. Carol Henderson** is the Director of the National Clearing House for Science, Technology and the Law; a Professor of Law at Stetson University College of Law; and the Past President at the American Academy of Forensic Sciences.

**Mr. John Hicks is the retired Director of the Office of Forensic Services, New York State Division of Criminal Justice Services; and the former Director at the FBI Laboratory.**

**Mr. Peter J. Neufeld** is the Co-Founder and Co-Director of the Innocence Project.

**Dr. J.C. Upshaw Downs** is the Coastal Regional Medical Examiner at the Georgia Bureau of Investigation.

## III. Issues and Concerns

Prompted by concerns over the reliability and variability of forensic evidence, the National Academy of Sciences Committee on Identifying the Needs of the Forensic Science Community recently completed a study on the status of the Nation's crime labs, *Strengthening Forensic Science in the United States: A Path Forward.* The committee found that many of the techniques and technologies used in forensic science lack rigorous scientific discipline. In addition, the committee reported a lack of standard accreditation processes for individual labs and the technicians who collect and process evidence.

The committee recommended that a new agency, separate from the legal and law enforcement communities, be created to provide oversight to correct these inconsistencies which impact the accuracy, reliability, and validity of forensic evidence. Many of the functions envisioned by the report committee for this new agency already are, or could be, performed at NIST. These activities include standards setting, the creation of validated test methodologies, and the development of standard practices. Indeed, the report recommends this new agency specifically work with NIST in several areas.

The report committee notes that on two fronts the forensic disciplines lack consistent science. The first concern is that different forensic disciplines vary in the de-

gree to which they are based on a well-tested, rigorous scientific methodology. For instance, whereas the methodology for fingerprint identification is scientifically proven, the analysis of other forensic evidence, like bite-mark comparisons, does not follow a prescribed and scientifically verified methodology. The second issue with consistency is the degree to which some disciplines rely on inexact interpretation to reach their findings and report their conclusions. This is evident in the practice of identifying partial or smudged fingerprints, when practitioners rely on judgment, instead of a reliable scientific methodology, which can introduce human error and bias. Furthermore, there is no consistent scale or nomenclature to report these types of findings. For example, the exact same finding could be reported as "a match" in one jurisdiction or "consistent with" in another jurisdiction.

**IV. Background**

DNA evidence has been widely used in the legal system for many years. DNA's accepted use in this capacity stems from the fact that it has been rigorously shown to identify, with a high degree of certainty, a connection between evidence and an individual of interest. This certainty can be traced back to efforts of NIST on the development of both the test methodologies for DNA analysis and the standard reference materials that can be used for laboratory as well as test certification. There are other common techniques used by forensic scientists such as fingerprint analysis, ballistic tests, hair matching, pattern recognition, and paint matching that could benefit from a robust research and development program. Many of these techniques based on observation, experience, and reasoning lack validation on their accuracy and reliability. Because of these shortcomings, many of the forensic tests can have high error rates. To resolve these issues, additional research and experimental testing detailing the reliability of the methods is required.

*Lack of Federal Standards*

The forensic science community includes crime scene investigators, State and local crime laboratories, medical examiners, private forensic laboratories, and law enforcement identification units. They may use registries of information, databases for matching, or reference materials for comparisons of evidence. The registries need a common interface to aid in training and accessibility for all users in the community. The databases need to be inter-operable to allow for communication between different sources. In addition, reference materials must be standardized so that test equipment can all be calibrated to an accurate and reliable level. Currently there are no clear and consistent standards for the forensic community to apply the tools available to them; instead there are many different methodologies with no single certification method for practitioners. Without clear and measurable standards for all forensic science disciplines, not just DNA analysis, it is impossible to assess whether one organization is properly conducting analyses. In addition, it is difficult to ascertain the validity of a specific forensic science methodology. The report recommends that standards need to be set for all facets of forensic science and a certification program needs to be developed for both the practitioners and laboratories.

Chair WU. Good morning. The hearing will now come to order.

I want to welcome everyone to this morning's hearing. The spur for this hearing was the release of a recent National Academy of Sciences report, Strengthening Forensic Science in the United States: A Path Forward. This report makes a number of recommendations on how to improve forensic science in the United States and many of the recommendations ask for research that supports forensic science and for standards and accreditation to ensure the validity, accuracy and reliability of forensic science testing.

The purpose of today's hearing is to determine whether we can build on the resources and expertise at the National Institute of Standards and Technology (NIST) to implement some of the report's recommendations. The report suggests creating an entirely new department to govern forensics issues and calls for this new agency to work with NIST. Given our current economic climate and other constraints, I would first like to explore how we can build upon and improve existing federal capabilities rather than trying to create a whole new governmental structure. We have all learned from the experience of creating the Department of Homeland Security that legislatively providing for a new agency is far easier and far different than from executing on the actual implementation of the new agency.

I fully support the goal of the report to improve forensic science in the United States. The popular television show, "Crime Scene Investigation," or CSI, has raised public awareness and expectation of the role of forensic science in helping us to solve crimes. However, the show depicts the practice of forensics in a manner that is far different from the current state of technology or our methodology. I hope that this hearing is a first step in bringing reality into better alignment with the high expectations created by our entertainment industry.

We have an experienced and distinguished panel of witnesses today. I want to thank each of you for taking the time to appear before the Subcommittee and I look forward to hearing your views and advice on how to move forward from here. We all want to support law enforcement and judicial process by providing the best forensic science base available.

Now I would like to recognize the Ranking Member of the Subcommittee, Representative Smith, for his opening statement.

[The prepared statement of Chair Wu follows:]

PREPARED STATEMENT OF CHAIR DAVID WU

Good morning. I want to welcome everyone to this morning's hearing. The spur for this hearing was the release of a recent National Academy of Sciences report: *"Strengthening Forensic Science in the United States: A Path Forward."* This report makes a number of recommendations on how to improve forensic science in the United States. Many of the recommendations ask for research that supports forensic science and for standards and accreditation to ensure the validity, accuracy, and reliability of forensic science testing.

The purpose of today's hearing is to determine whether we can build on the resources and expertise at the National Institute of Standards and Technology to implement some of the report's recommendations. The report suggests creating an entirely new department to govern forensics issues and calls for this new department to work with NIST. Given the current economic climate I would like to explore how we can build upon and improve existing federal capabilities rather than trying to create a whole new government structure. We have all learned from the creation

of the Department of Homeland Security that legislating a new agency is far easier than executing on the implementation of the new agency.

I fully support the goal of the report to improve forensic science in the United States. The popular television show "Crime Scene Investigation," better known as CSI, has raised public awareness and expectation of the role of forensic science in solving crimes; however, the show depicts the practice of forensics in a manner that is far different from the current state of technology. I hope this hearing is a first step in moving from entertainment to reality.

We have an experienced and distinguished panel of witnesses today who all have important and busy jobs. I want to thank them for taking the time to appear before the Subcommittee today. I look forward to hearing their views and advice on how to move the process forward. We all want to support our law enforcement and judicial processes by providing them with the best forensic science base possible.

Mr. SMITH. Mr. Chair, thank you for holding this hearing today on the very important issue of forensic science. Many, if not most, of the issues we undertake in this subcommittee have direct implications well beyond our scientific and technological enterprise. Forensic science is no different but it is certainly of particular unique importance in that it is a key factor in the fundamental functioning of our justice system. This importance has only increased in recent years through the advancement of new technologies that have enabled forensics to contribute a growing amount of information to law enforcement investigations as well as courtroom proceedings. These advances undoubtedly improved our ability to not only identify and convict the guilty but also, very importantly, exclude the innocent. However, as the National Academy of Sciences' [NAS] report on strengthening forensic science demonstrates, continued improvement is necessary to maximize the quality of and our corresponding confidence in forensic evidence that is used in the courtroom. The NAS report's core finding, that many forensic disciplines are in need of more rigorous scientific review to validate their accuracy and reliability, is very serious and requires the full and immediate attention of Congress, the justice system and certainly the forensic science community.

But it is important to remember the absence of rigorous scientific underpinning in many forensic disciplines does not mean these methods are inaccurate or unreliable. Accordingly, I think it is important to recognize the enormous value forensic evidence provides to the justice system, even in the absence of full scientific validation, and accordingly exercise caution to ensure we are not overly dismissive of forensic evidence.

The immediate focus of this hearing today, however, is to review the scientific and technical recommendations of the NAS report and discuss how they can best be addressed, particularly through the National Institute of Standards and Technology, which has the programs and expertise to be a key driver of improvements in forensic science.

I thank the witnesses for being here today, and I look forward to a productive discussion.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF REPRESENTATIVE ADRIAN SMITH

Mr. Chairman, thank you for holding this hearing today on the very important issue of forensic science. Many if not most of the issues we undertake in this subcommittee have direct implications well beyond our scientific and technological enterprise. Forensic science is no different, but it is of particularly unique importance in that it is a key factor in the fundamental functioning of our justice system.

This importance has only increased in recent years through the advancement of new technologies that have enabled forensics to contribute a growing amount of information to law enforcement investigations as well as courtroom proceedings. These advances have undoubtedly improved our ability to not only identify and convict the guilty, but also exclude the innocent.

However, as the National Academy of Sciences report on strengthening forensic science demonstrates, continued improvement is necessary to maximize the quality of—and our corresponding confidence in—forensic evidence that is used the courtroom.

The NAS report's core finding—that many forensic disciplines are in need of more rigorous scientific review to validate their accuracy and reliability—is very serious, and requires the full and immediate attention of Congress, the justice system, and the forensic science community.

But it is important to remember the absence of rigorous scientific underpinning in many forensic disciplines does not mean these methods are inaccurate or unreliable; it simply means they are in need of evaluation. Accordingly, I think it is important to recognize the enormous value forensic evidence provides to the justice system even in the absence of full scientific validation, and accordingly exercise caution to ensure we are not overly dismissive of forensic evidence.

The immediate focus of this hearing today, however, is to review the scientific and technical recommendations of the NAS report and discuss how they can best be addressed, particularly through the National Institute of Standards and Technology, which has the programs and expertise to be a key driver of improvements in forensic science.

I thank the witnesses for being here, and I look forward to a productive discussion.

Mr. SMITH. One final item, Mr. Chair. I do have a letter from the National District Attorneys' Association, and with unanimous consent I ask that it be included in the record. [*See Appendix 2: Additional Material for the Record.*]

Chair WU. Without objection, so ordered.

Mr. SMITH. Thank you, Mr. Chair.

Chair WU. Thank you, Mr. Smith.

If there are other Members who wish to submit additional opening statements, your statements will be included in the record at this point.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Thank you, Mr. Chairman.

Today we will discuss issues related to the accuracy, standards, reliability, and validity of forensic science and how the National Institutes of Standards and Technology can play a role in developing standards and certified test methodologies related to forensic science.

According to *Strengthening Forensic Science in the United States: A Path Forward,* a study conducted by the National Academy of Sciences Committee on Identifying the Needs of the Forensic Science Community, many of the techniques and technologies utilized in forensic science lack rigorous scientific discipline.

Furthermore, this study also found that individual labs and the technicians who collect and process evidence do not utilize consistent and standard accreditation methods.

I look forward to hearing more from our witnesses on how NIST can play a role in the standardization of forensic science methodology.

I yield back.

[The prepared statement of Mr. Broun follows:]

PREPARED STATEMENT OF REPRESENTATIVE PAUL C. BROUN

Good Morning. I'd like to thank Chairman Wu and Ranking Member Smith for hosting this important hearing. I'd also like to join them and the rest of my colleagues in welcoming our esteemed guests. The National Academy of Sciences recent report: *"Strengthening Forensic Science in the United States: A Path Forward,"* set forth numerous ideas to improve the forensic sciences including upgrading our systems and organizational structures, better training, widespread adoption of uniform

and enforceable best practices, and mandatory certification and accreditation programs. These are all reasonable and necessary recommendations which would go a long way toward improving forensic science in the United States and I applaud the members of the National Academies for their diligence and hard work in assembling this report as we look to improve the reliability and accuracy of forensic testing.

As a scientist, I value truth above all else. I believe a vital component of our judicial system should be to provide a means of forensic testing that is beyond reproach in its accuracy and is uniform in its application. It is of a vital national interest that our forensic science techniques and procedures be as close to perfect as possible. It's a shame that forensic evidence has been misinterpreted in that past and resulted in innocent people being jailed unjustly, or conversely in the guilty being set free. So I stress that it is absolutely vital that we continue to commit resources towards furthering forensics with specific goals of one day reaching 100 percent accuracy and of broadening the applications for its use.

However, I must join with the Chairman in my skepticism of creating an entirely new department to oversee this venture. Not only is it rarely ever a good idea for the Federal Government to create a new bureaucracy, as the Chairman has already stated, but in my view it is unconstitutional to do so, as nowhere in the documents our Founding Fathers penned do they afford Congress that power. Instead, I believe that we should look to individual states to set uniform standards for use within their borders, or expanding the resources available to NIST and authorizing them to formulate and set new standards and to test current and potential forensic science techniques which may be even more beneficial to the pursuit of truth into the future. Any move to federalize forensic science is a move to stifle scientific freedom and in its place adopt more government control.

I look forward to hearing testimony from these many fine scientists who have graciously come before us today and I hope they can help us move towards our mutual goal of strengthening forensic science and its applications in our criminal justice system.

Thank you again for allowing me the time to speak today Mr. Chairman.

Chair WU. It is my pleasure to introduce our panel of witnesses. Mr. Pete Marone is the Director of Technical Services at the Virginia Department of Forensic Science. Ms. Carol Henderson is the Director of the National Clearinghouse for Science, Technology and the Law. She is also a Professor of Law at Stetson University College of Law and the Past President of the American Academy of Forensic Sciences. Mr. John Hicks is the retired Director of the Office of Forensic Services at the New York State Division of Criminal Justice Services and the former Director of the FBI Laboratory. Dr. Jamie Downs is the Coastal Regional Medical Examiner at the Georgia Bureau of Investigation. And our final witness is Mr. Peter Neufeld, who is the Co-Founder and Co-Director of the Innocence Project.

Mr. Marone, if you would like to proceed, you will each have five minutes for your spoken testimony and your written testimony will be included in the record. When you complete your testimony—all of you complete your testimony—we will begin with questions and each Member will have five minutes to question the panel. Mr. Marone, please proceed.

## STATEMENT OF MR. PETER M. MARONE, DIRECTOR, VIRGINIA DEPARTMENT OF FORENSIC SCIENCE

Mr. MARONE. Thank you, Mr. Chair, Ranking Member Smith. It is certainly a pleasure, and I appreciate the opportunity to speak to this committee. My name is Peter Marone and I have gotten a promotion since then. I am Director of the Commonwealth of Virginia's Department of Forensic Science now and was a member of the committee identifying the needs of the forensic science community. Of course, this was a study that NIJ [National Institute of Justice] funded at the request of the Senate Appropriations Com-

mittee but it was really requested quite heavily by the forensic science community to make it happen.

In the testimony today, what I would like to do is shorten and simplify all the recommendations of the committee and specify or spend the time on four particular issues and the full potential of the program, broken into scientific and technical challenges that must be met in order for forensic science enterprise to reach its full potential. I would like to break it into four categories, the first being funding, resources, if you will, research, standardization, and education.

The first element really is probably one of the most important, and it was not specifically addressed as a recommendation by the committee, and that is the resource issue. Although we didn't address it as a particular criteria, it was very, very understood by the committee that for the State and local laboratories there was a lack of resources, whether it be money, staffing, training or equipment necessary to promote and maintain strong forensic science systems. As you are acutely aware right now, states are now in a fiscal crisis. I would submit that laboratories and medical examiners' offices have been in a fiscal crisis for a number of years. This is nothing new for us. Further, the funding from the Federal Government has really been focused overwhelmingly to one discipline, and that is DNA. What I would like to say as an individual is, make it very clear that we are asking for funding for the full breadth of the forensic science disciplines but not to the exclusion of DNA. In other words, we are saying very clearly, don't take the DNA money and give it to everybody else, keep all the disciplines funded and supported. I want to make that very, very clear because in a lot of issues that is a misunderstanding.

Under the category of research, the committee determined that the forensic science disciplines need further research to provide the proper underlying validation for some of the methods in use and to provide the basis for more precise statements about their reliability and precision. The report clearly states that there is a value in many of the disciplines addressed that the forensic science community itself has been stating for more than a decade. In order to accomplish this we need more funding for research and a stronger, broader research base. Disciplines based on biological or chemical analysis such as toxicology, drug analysis, some trace-evidence disciplines such as explosives, fire debris, paint and fiber analysis are all well validated and shouldn't be in the same category as the experience-based disciplines such as fingerprints, firearms and tool marks and other pattern recognition types of analysis. We need studies, for instance, that look on a large population of fingerprints and tool marks just to qualify how many sources might share similar features. Similarly, we need more research on the issues of context effect and examiner bias.

In standardization, for example, one of the issues was that laboratories need to be mandatorily accredited. During our reviews, we found that there are approximately 400 laboratories—publicly funded laboratories in the United States, but 320 of them are already accredited so it is not like the laboratories aren't espousing this idea, and the same thing for the not-mandatory certification.

There are a significant number of individuals who are voluntarily being certified.

The primary conclusion was that the forensic science enterprise doesn't have a unified plan. It needs strong, fresh, national direction. Strong leadership is needed to adopt and promote aggressive long-term agenda to strengthen forensic science. Our report strongly urges Congress to establish a new independent institute of forensic science to lead the research efforts, establish and enforce standards for forensic science professionals, and oversee education. Now, I understand that NIST [National Institute of Standards and Technology] serves that purpose to a certain extent and we all agree that NIST does serve a very important purpose. It does have expertise in standardization and experience in a number of those types of issues for establishing coherent laboratory practices and reporting professionalism, codes of ethics and so forth. What NIST doesn't have is all the package, and as the committee reviewed all the existing entities, nobody has the global experience necessary to complete the package, to give all the planning. There are bits and pieces in every one of them, nobody has that, and the key is that whatever entity this is has to be something that is new in the sense that the fear is if you put it in an existing entity or under an existing agency, they will tend to create the new entity in their own image and likeness, if you will. In other words, they will continue doing things the way they do, and what we really need is fresh thinking, new thoughts, new issues to be addressed.

I will finish up quite quickly here now. Mr. Chair and Members of the Committee, I would like to thank you for the opportunity to come here today. I would like to conclude by quoting a part of our study which I believe is one of the most important statements and findings we had. "Numerous professionals in the forensic science community and the medical examiner system worked for years to achieve excellence in their fields, aiming to follow high ethical norms, develop sound professional standards, ensure accurate results in their practices and improve the processes by which accuracy is determined. Although the work of these dedicated professionals has resulted in significant progress in the forensic science disciplines in recent decades, major challenges still face the forensic science community."

I thank you for your time. I will be pleased to answer any questions you have.

[The prepared statement of Mr. Marone follows:]

PREPARED STATEMENT OF PETER M. MARONE

Good morning, Mr. Chairman and Members of the Committee. My name is Pete Marone. I am Director of the Commonwealth of Virginia's Department of Forensic Sciences and a member of the Committee on Identifying the Needs of the Forensic Science Community of the National Research Council. The Research Council is the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine of the National Academies, chartered by Congress in 1863 to advise the government on matters of science and technology. Our study was sponsored by the National Institute of Justice at the request of the Senate Appropriations Committee.

This study, as you know, was requested by Congress at the urging of the Crime Lab Community itself. The charge was (1) assess the present and future resource needs of the forensic science community, to include State and local crime labs, medical examiners, and coroners; (2) make recommendations for maximizing the use of forensic technologies and techniques to solve crimes, investigate deaths, and protect

the public; (3) identify potential scientific advances that may assist law enforcement in using forensic technologies and techniques to protect the public; (4) make recommendations for programs that will increase the number of qualified forensic scientists and medical examiners available to work in public crime laboratories; (5) disseminate best practices and guidelines concerning the collection and analysis of forensic evidence to help ensure quality and consistency in the use of forensic technologies and techniques to solve crimes, investigate deaths, and protect the public; (6) examine the role of the forensic community in the homeland security mission; (7) [examine the] inter-operability of Automated Fingerprint Information Systems; and (8) examine additional issues pertaining to forensic science as determined by the Committee. The reason the community asked for this study was due to the fact that the focus of the Federal Government has been on the single discipline of DNA. The community, including myself, knew that the other disciplines and the state of our system needed to have further resources and assistance from the Federal Government. In my testimony today I will simplify, due to time, our report—*Strengthening Forensic Science in the United States: A Path Forward*—into the scientific and technical challenges that must be met in order for the forensic science enterprise in the United States to operate to its full potential. Specifically, I will discuss them in four classes of resources, research, standardization, and education, as these are the primary challenges at this time. The report found that some of this work has already been begun by forensic scientists, but that additional effort and coordination are needed to carry it through.

The first element of the charge, while not specifically addressed in the form of a recommendation, led to a clear committee understanding that in general, "for the State and local laboratories there has been a lack of resources (money, staff, training, and equipment) necessary to promote and maintain strong forensic science laboratory systems." As I know you are acutely aware, the states are in a fiscal crisis. As a State Crime Lab Director I know that this has in fact been the situation for some time. As such, the State and local Crime Labs and the Medical Examiner community have not been receiving the funds they need, but the case load has been increasing exponentially. Further, the funding from the Federal Government has been focused overwhelmingly on the discipline of DNA, which is not our largest caseload. The Congress has consistently put some funding in for the other disciplines but it falls far short of what is necessary. I want to make it clear, Mr. Chairman, that this is at the root of many of our issues and, speaking as an individual, I am asking Congress to please put funding in at an adequate level for all of forensic science, not just a single discipline.

Under the category of research, the committee determined that some of the forensic science disciplines need further research to provide what the scientific community commonly uses as the proper underlying validation for some of the methods in common use and to provide the basis for more precise statements about their reliability and precision. Because a method has not been sufficiently validated does not make it invalid. In order to accomplish this, we need more funding for research and a stronger, broader research base. The disciplines based on biological or chemical analysis, such as toxicology, drug analysis, and some trace evidence sub-disciplines such as explosives, fire debris, polymers to include paint and fiber analysis, are generally well validated and should not be included in the same category as the more experience-based disciplines, such as fingerprints, firearms and toolmarks, and other pattern-recognition types of analysis. There are variations within this latter group; for example, there is more available research and protocols for fingerprint analysis than for bite marks. We need studies, for instance, that look at large populations of fingerprints and toolmarks so as to quantify how many sources might share similar features. In addition to investigating the limits of the techniques themselves, research is also needed on the effects of context and examiner bias.

In the realm of standardization and education our report raised concerns about the lack of mandatory requirements for professional certification and for laboratory accreditation and the variability in the way forensic science results are reported in courts. I think it is critical to first understand that most in the forensic science community have already begun to move in the direction of accreditation; in fact the recently published *Census of Publicly Funded Crime Laboratories, 2005* stated that by 2005, 82 percent of the public laboratories were accredited. That number is even higher today. But more can be done. Our report calls for certification that is based on written examinations, supervised practice, proficiency testing, and adherence to a code of professional practice. The report explicitly calls for the National Institute of Standards and Technology, NIST, in collaboration with the proposed National Institute of Forensic Science [NIFS] to be involved in setting standards for certification and accreditation and in developing protocols and best practices for forensic analysis, using existing programs as a basis. Assisting laboratories which have not

yet been accredited is a lengthy process. Each policy and method must be reviewed to determine if it is in compliance and, if not, what must be done to bring it into compliance. This process can take a few years. That is not to say that the work done by the laboratory is suspect during the process, but that the standards and criteria are quite specific.

Our report's primary conclusion is that the forensic science enterprise does not have a unified plan and needs strong, fresh national direction. Strong leadership is needed to adopt and promote an aggressive, long-term agenda to strengthen forensic science. Our report strongly urges Congress to establish a new, independent National Institute of Forensic Science to lead research efforts, establish and enforce standards for forensic science professionals and laboratories, and oversee education standards. Our committee carefully considered whether such a governing body could be established within an existing agency, and determined that it could not. While we recognize the difficulty with this task, we believe that the root of the struggles this community has is the lack of federal support and guidance.

However, while we were impressed with the technical abilities of three NIST staffers who briefed our committee, and in fact had a NIST scientist as a member of our committee, we concluded that NIST does not have expertise in enough of the essential areas to play the governance role that forensic science needs. First, while NIST has a strong reputation in some aspects of forensic science, it would not be seen by that community as a natural leader. In large part that is because the context in which forensic science operates is unique. For example, forensic science must make the most of whatever evidence has been collected, a situation that is not always amenable to prescriptive standards. And the recommended new federal entity must be sensitive to the interplay between forensic sciences and the criminal justice system, which is unfamiliar territory for NIST. Our report calls on the new entity to lead an effort to remove public forensic laboratories from the administrative control of law enforcement agencies or prosecutors' offices or be autonomous within such agencies. That is likely to be a difficult task, one that requires knowledge of relationships among those operations and between federal, State, and local jurisdictions. It is a challenge to which NIST is not well suited.

As I already indicated, a key recommendation of our report is to build up the research base and educational infrastructure that will enable forensic science to move forward. NIST does not have much experience in establishing and running an extramural research program, and its ability to stimulate new academic forensic programs and strengthen existing ones is untested. Another key requirement is to strengthen the practices of forensic science. While NIST has great expertise in establishing laboratory standards, it has not previously taken on a task similar to what is required for forensic science: establishing a coherent set of standards for laboratory practice, reporting, and professionalism (including codes of ethics), along with standards and practices for laboratory accreditation and professional certification and incentives for their widespread adoption.

NIST does not have expertise in, and influence over, the medicolegal death investigation system, nor expertise in the issues that need to be addressed to strengthen that system, a critical recommendation in our report.

However, the strongest reason for establishing a new independent entity is that it could then be established according to the vision laid out in our report. If a new institute is established as an arm of some existing entity, that entity will tend to design it according to its own existing knowledge and experience, with whatever bureaucracy or biases that entails. As an example of this very issue, a draft copy of a white paper from NIST, provided to me by the staff of this committee regarding the establishment of a National Institute of Forensic Science within NIST, lists a number of actions it proposes to answer the recommendations of the NAS report. However, what was not addressed at all in that proposal was how the existing accreditation programs (both for laboratories and forensic science undergraduate and graduate education programs), programs for certification of individuals, and the technical protocols (although not mandatory) that are already in place through the various scientific working groups (SWGs) and in use by many laboratories, would serve as a basis for and be incorporated into the plan. There also was no indication as to how laboratories would be supported in their efforts to meet these standards.

Mr. Chairman and Members of the Committee, I thank you for the opportunity to come before you today. I'd like to conclude by quoting a part of our study which I believe is one of the most important statements and findings we had:

> "Numerous professionals in the forensic science community and the medical examiner system have worked for years to achieve excellence in their fields, aiming to follow high ethical norms, develop sound professional standards, ensure accurate results in their practices, and improve the processes by which accuracy

is determined. Although the work of these dedicated professionals has resulted in significant progress in the forensic science disciplines in recent decades, major challenges still face the forensic science community."

Again, thank you for your attention, and I will be pleased to answer questions.

## *International Association for Identification*

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February 19, 2009

Yesterday the National Academy of Sciences (NAS) released the long-awaited report of the Committee titled *Identifying the Needs of the Forensic Science Community*. That report contains numerous items of interest to members of the International Association for Identification (IAI). There has not been adequate time to fully evaluate the entire 254 page report but based on preliminary reviews, below are some points that might be considered if members are queried regarding the report:

- The Consortium of Forensic Science Organizations (CFSO) (website: www.thecfso.org) of which the IAI is a member was largely responsible for convincing Congress of the need for this committee. We thank Congress and the National Academies for their hard work over the past several years to produce this report and call attention to the needs of the nation's forensic community.

- The IAI has over the years supported the need for this kind of study. During the course of the NAS hearings the IAI was invited to present its positions concerning these issues. With the release of this report, the IAI stands ready to support many of the committee's recommendations and work with the necessary parties to achieve those goals.

- The IAI endorses continuing research in pattern evidence to include fingerprint evidence. In fact that was recognized in the final paragraph of the IAI's Standardization Committee's report in 1973 that called for additional research to be conducted to provide continuing scientific support to fingerprint identification

- Over the years a number of research projects have been conducted. None of those projects refuted the scientific principle that fingerprints are unique and permanent.

- There is no research to suggest that properly trained and professionally guided examiners cannot reliably identify whole or partial fingerprint impressions to the person from whom they originated.

- The IAI endorses accreditation of forensic service providers as well as certification of examiners in their respective disciplines. To that end the IAI put in place its first certification program 32 years ago and to date has added certification programs in six additional disciplines.

- Members who may have to testify about friction ridge identifications are reminded that the admissibility of their testimony rests with the presiding judge. Challenges to the underlying science and practice are handled in Daubert/Frye type hearings and should not affect direct testimony in the trial proper.

- It is suggested that members not assert 100% infallibility (zero error rate) when addressing the reliability of fingerprint comparisons.

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- Although the IAI does not, at this time, endorse the use of probabilistic models when stating conclusions of identification, members are advised to avoid stating their conclusions in absolute terms when dealing with population issues.
- The IAI will be asking its science and practice committees to review the NAS report over the next few weeks and will provide the membership with additional guidance in the future.
- The Executive Summary of the report is available at: www.nas.edu at no cost. The entire report is available from the same website at a cost of $33.00.

*Robert Garrett*
*IAI President*

BIOGRAPHY FOR PETER M. MARONE

B.S. Chemistry, University of Pittsburgh, 1970

M.S. Chemistry, University of Pittsburgh, 1971

Pete Marone began his forensic career at the Allegheny County Crime Laboratory in 1971 and remained in Pittsburgh until 1978 when he accepted a position with the Virginia Bureau of Forensic Science. In 1998 he became the Central Laboratory Director with the Division. On February 1, 2007 he was appointed Director of the Virginia Department of Forensic Science. He is a member of the American Society of Crime Laboratory Directors (ASCLD), American Academy of Forensic Sciences, Mid-Atlantic Association of Forensic Scientists, Forensic Science Society, and the International Association for Chemical Testing. He has served on the ASCLD DNA Credential Review Committee and as the chair of the undergraduate curriculum committee of the Technical Working Group for Forensic Science Training and Education (TWGED), is a past Chair of ASCLD–LAB (Laboratory Accreditation Board). He is a member of the Forensic Education Program Accreditation Commission (FEPAC) for the American Academy of Forensic Sciences, and served on the National Academy of Sciences Committee on Identifying the Needs of the Forensic Science Community. He is currently Chair of the Consortium of Forensic Science Organizations (CFSO).

Chair WU. Thank you, Mr. Marone.

Ms. Henderson, please proceed.

**STATEMENT OF MS. CAROL E. HENDERSON, DIRECTOR, NATIONAL CLEARINGHOUSE FOR SCIENCE, TECHNOLOGY AND THE LAW; PROFESSOR OF LAW, STETSON UNIVERSITY COLLEGE OF LAW; PAST PRESIDENT, THE AMERICAN ACADEMY OF FORENSIC SCIENCES**

Ms. HENDERSON. Thank you, Mr. Chair and Members of the Subcommittee. I was already introduced but I wanted to mention that as the Director of the National Clearinghouse for Science, Technology and the Law, we have created the only searchable database in the world of Raw science and technology information. As you mentioned, I am also a Professor of Law and the immediate Past President of the American Academy of Forensic Sciences, and in fact, two of the officers of the Academy are here in the audience today.

I was an Assistant United States Attorney with extensive experience; I was also a founder of the Florida Innocence Project; and I have more than 20 years of involvement in teaching and scholarly writing on the interface of science and law. I am well aware of the

importance of forensic science to the justice system and the nexus between science and law is critical to forensic science. We therefore have to recognize that the forensic overhaul which has been desired by the NAS [National Academy of Sciences] committee with extensive work, and I did go to four of the five hearings that they had, requires a collaboration of all the stakeholders: attorneys and judges, crime laboratory and technical personnel and the civil expert witnesses as well.

I believe we have really been presented with an opportunity to make forensic science serve justice even more reliably and effectively. This is the time to build better forensic science, but we must be realistic in regard to the urgency of acting now and not permitting defects identified in the report to go unaddressed, yet we have to make the best use of available resources and go forward in a measured and considered manner that creates sound and lasting systems. I am therefore recommending a three-step approach.

One is immediate action using existing federal resources to address scientific standards. Two, we need interim action which will evaluate strategic policy decisions and strategies and explore innovative solutions. Vision is needed. And then a long-term goal of creating a National Institute of Forensic Sciences [NIFS] as envisioned by the [NAS] committee.

The urgent action, which I am going to go to first, is making the best use of our existing resources. Many of the issues that were identified in the report concern scientific foundation of disciplines and subdisciplines in forensic science. The concerns range from, and I quote, "Are these techniques fundamentally unsound" to, while there is a body of evidence that the techniques are of value, there is a lack of validation to the degree that has been established in the introduction of DNA testing. There is an existing federal agency well suited to the task, namely the National Institute of Standards and Technology [NIST]. This is where we can begin. NIST has a national role in promoting scientific standards and has made significant contributions to the core science in several areas of forensic science, although not in all areas of forensic science.

Now I would like to move on to the interim action. We need to implement a program to address policy issues and focus on innovative processes and these include, and I have to echo Pete, we need research, much more of it. We need education, and it is not just for the people who are in the crime laboratories, but for lawyers and judges. We need, of course, to continue accreditation and credentialing. We cannot be bridged with a Band-Aid, and I brought crime scene Band-Aids to show you all. You can have one later. All right. But, it is true a Band-Aid is not going to solve this problem, but a bridge will, and I think that is one thing that we have to look at. So these interim issues must be addressed, and in fact, notably, I have to tell you, there are very few papers regarding forensic science policy out there, and that is something else that needs to be addressed as well. There is no established forensic equivalent to think tanks like the Aspen Institute, and my objective in discussing these interim objectives with you is to emphasize how important they are and the need for carefully thought out policy and strategic planning.

The long-term action is to create a NIFS, and I am very familiar with NIFS in Australia. It took them 20 years to get off the ground. And I talked to Alistair Ross, who is now the interim director, who was the original director there, and I talked to him last night. Many of the recommendations say this is great to have an oversight and coordinating body, but you really have to be practical, and I have to say, that is one thing: I am practical. This committee knows all too well the lengthy, you know, consultative processes that will have to be undertaken if the government chooses to pursue creating a NIFS in the United States. The process will not be instant and will, as with the interim issues discussed above, benefit from careful analysis of policy, strategic planning and implementation factors.

All right. So now I would like to talk about the overhaul, which is what was recommended in the NAS report, and these are more general considerations based on my personal experience both as a law professor, a federal prosecutor and the Past President of the American Academy of Forensic Sciences [AAFC], although as I mentioned, I am not here as a spokesperson for the Academy, only the president or the president-elect can speak. The lack of academic freedom in research and development results in a stifling of forensic science. As long as the overwhelming body of forensic science does not challenge itself or respond to the voices of all its stakeholders, especially the legal community which is a primary stakeholder, we won't move forward. I do have great hope, though, for forensic science. In fact, my theme while I was the President [of AAFS] was, Forensic Science: Envisioning and Creating the Future. AAFS, I have to tell you, has recognized education, credentialing accreditation, and we actually raised more than $300,000 last year for forensic science research because I knew, and I think all of us knew, it was a priority. And we have really welcomed the NAS report, and under President Tom Bohan, who is in the audience here, we will continue to champion changes to the forensic landscape.

So how do we make significant changes? We can draw an analogy with the race to the Moon. The Space Age had catastrophes just like forensic science, but its successes came because there was a stretching, but achievable goal and scientists and engineers at NASA could apply themselves to delivering successful outcomes. Give forensic science the same target and we will see even more progress than has been achieved so far. Challenging the status quo is as important as a unified commitment to a clear set of objectives and a strategic plan. We must identify innovative approaches. It is very key to be strategic. Innovation is a cultural issue as much as one of the infrastructure and a case can be illustrated by comparison to the medical model of education and research. Medical schools in top-tier universities act as centers of excellence and a second opinion is allowed, in fact expected. By contract, forensic science sometimes responds defensively to criticism and regards requests for a second opinion as a slight and not as a tool to encourage interaction with stakeholders. I have to say, Representative Gordon, the Chair of the House Committee on Science and Technology, has reminded us that scientific progress occurs when we foster the open exchange of ideas and information. That is excellent

advice and could form the basis of a goal of collaboration between all our stakeholders, and President Obama has also pledged to place science at the top of the national agenda commitment, and that is something we in forensic science embrace.

I would like to thank the Committee for the opportunity to address you and your serious consideration of the report.

[The prepared statement of Ms. Henderson follows:]

PREPARED STATEMENT OF CAROL E. HENDERSON

Mr. Chairman and Members of the Subcommittee:

My name is Carol Henderson. I am the Director of the National Clearinghouse for Science Technology and the Law (NCSTL), which is a program of the National Institute of Justice. Through my leadership of NCSTL, I have been responsible for creating the only searchable database on science, technology and law information in the world. I am a Professor of Law at Stetson University College of Law, and the immediate Past President of the American Academy of Forensic Sciences. As an Assistant United States Attorney with extensive experience, a founder of the Florida Innocence Project, and more than twenty years of involvement in teaching and scholarly writing on the interface between science and law, I am well aware of the importance of forensic science to the justice system. The nexus between science and law is critical to forensic science. We therefore have to recognize that the "forensic overhaul" desired by the NAS Committee on Identifying the Needs of the Forensic Sciences Community requires the collaboration of all stakeholders: attorneys and judges, crime laboratory and technical personnel, and civil expert witnesses.

We have been presented with an opportunity to make forensic science serve justice even more reliably and effectively. This is the time to build better "forensic science." However, we must be realistic in regard to the urgency of acting now and not permitting defects identified in the report to go unaddressed, yet make the best use of available resources and go forward in a measured and considered manner that creates sound and lasting systems.

I am therefore recommending a three-step approach:

- immediate action that uses existing federal resources to address scientific standards;
- interim action to evaluate strategic policy directions and strategies and explore innovative solutions;
- a long-term goal of creating a National Institute of Forensic Sciences (NIFS) as envisioned by the NAS Committee on Identifying the Needs of the Forensic Sciences Community.

**Urgent Action: Making the best use of existing resources:**

Many of the issues identified in the report concern the scientific foundation of disciplines and sub-disciplines in forensic science. The concerns range from "are these techniques fundamentally unsound" to "while there is a body of evidence that the techniques are of value, there is a lack of validation to the degree that has been established in the introduction of DNA testing."

There is an existing federal agency well-suited to the task, namely the National Institute of Standards and Technology (NIST). NIST has a national role in promoting scientific standards, and has made significant contributions to the core science in several areas of forensic science. Its successes include advancement of the fundamental science of forensic DNA testing, fundamental work on AFIS systems, and major contributions to firearms comparisons. These bring together areas defined at various points in the NAS report as being the new scientific gold standard of forensic testing (DNA) and areas that are badly in need of fundamental research to provide a valid scientific basis to support decades of technical experience (fingerprinting and firearms/tool mark examination). NIST also has a well-deserved reputation for independence—a recurring concern of the NAS panel.

**Interim Action: Implement a program to address policy issues and focus on innovative processes:**

The corollary to the need for rapid action and using existing resources such as NIST to address scientific standards, is that the wider issues such as those of the independence of crime laboratories and encouraging education, research, accredita-

tion and credentialing, require very careful development and consideration. For example, more than 90 percent of the Nation's crime laboratories are housed in law enforcement agencies. Any effort to change that will have major budgetary and operational consequences. We need to be certain that such action is founded in fact and that the change will produce the benefits expected. The very fact that more than 90 percent of the Nation's crime laboratories are administered from within law enforcement agencies means that sophisticated models and analysis will be needed to prove the case.

Accreditation has already been addressed in the forensic community. There are established programs that provide accreditation to international standards and that have been accepted by the great majority of forensic science service laboratories, and indeed, as is recognized in the report, some states require their forensic science laboratories to be accredited. There are also existing certification programs in the forensic community, but there are no mandatory requirements and the response of public and private laboratories has been sketchy. The courts also have a vital say, with their role as gatekeepers of admissibility. The whole question of federal, State and local recognition, creation and funding of registration bodies, and the definition of meaningful certification standards is another case where a considered policy review is required to prevent waste of resources and miss-steps in implementation.

The report identified shortcomings in research, education, and standards of practice in the Nation's crime labs. In-depth research and analysis of options leading to strategic policy and implementation plans is needed. The infrastructure to address the absence of a national research agenda in forensic science does not exist; the gap between service standards and high quality and life-long education cannot be bridged with a band-aid; and realization of the committee's recommendation to create a National Institute of Forensic Science (NIFS) as an independent oversight and coordinating body is a long-term issue.

These interim issues must be addressed, notably papers regarding forensic science policy are marked by their absence. There is no established forensic equivalent to think tanks like the Aspen Institute, for example. My objective in discussing these interim objectives with you is to emphasize their importance and the need for carefully thought-out policy and strategic planning.

**Long-term action: Create a National Institute of Forensic Science (NIFS):**

Many of the recommendations of the NAS Committee on Identifying the Needs of the Forensic Sciences Community center on NIFS as an oversight and coordinating body, and defer action to NIFS. However, it took more than 20 years from articulation of the concept before there was an operational NIFS in Australia. This committee knows only too well the lengthy consultative processes that will have to be undertaken if the Government chooses to pursue creating a NIFS in the United States. The process will not be instant and will, as with the interim issues discussed above, benefit from careful analysis of strategic policy and implementation factors, leading to a policy and implementation plan.

**The focus of the make-over**

I would like to turn now to more general considerations based on my personal experience as a law professor, federal prosecutor and Past President of the American Academy of Forensic Sciences (AAFS). There is a tendency for crime laboratory administration to be conservative, and its ability to foster communication, collaboration and innovation probably suffers—as alluded to in the report—from the absence of a meaningful university presence in forensic science. The lack of academic freedom in research and development results in stifling of forensic science. As long as the overwhelming body of forensic science does not challenge itself or respond to the voices of all its stakeholders, especially the legal community which is its primary stakeholder, we will not move forward.

I have great hope for the future of forensic science. In fact, my theme while I was President of the AAFS was "Forensic Science: Envisioning and Creating the Future." AAFS has recognized the importance of education and credentialing by creating a Forensic Science Programs Education Committee and the Forensic Specialities Accreditation Board to review the quality of forensic education programs and assess boards or organizations that certify individual forensic scientists or other specialists. The Forensic Sciences Foundation during my presidency of AAFS raised more than $300,000 to support research. AAFS has welcomed the NAS report and under President Tom Bohan will continue to champion changes to the forensic landscape.

These initiatives are a start, but how can we make the significant changes that are needed? We can draw an analogy with the race to the Moon. The space age had

its catastrophes just like forensic science, but its successes came because there was a stretching but achievable goal and the scientists and engineers at NASA could apply themselves to delivering successful outcomes. Give forensic science the same target and we will see even more progress than has been achieved so far. Challenge to the status quo is as important as a unified commitment to a clear set of objectives and a strategic plan.

Identifying innovative approaches is therefore a key strategic issue: forensic science will not be made better by providing increased funds to do more of the same things that have led it to where it is. "Innovation" is a cultural issue as much as one of infrastructure and the case can be illustrated by comparison to the medical model of education, research and service delivery. Medical schools in top tier universities act as centers of excellence that truly advance medical science, including the critical role of transition from student to resident to faculty, with an on-going commitment to professional development and research. The "second opinion" is a natural and accepted part of medical practice. Centers of excellence attract independent and critical minds, ever seeking to find new and better diagnostic and therapeutic tools. By contrast, forensic science sometimes responds defensively to criticisms and regards requests for a "second opinion" as a slight and not as a tool to encourage interaction with stakeholders.

Rep. Bart Gordon, the Chairman of the House Committee on Science and Technology, has reminded us that "Scientific progress occurs when we foster the open exchange of ideas and information." That is excellent advice and could form the basis of a goal of "Collaboration between all stakeholders to build, by 2014, a solid foundation from which reliable scientific and technologic services can be provided to the whole of the justice system." President Obama has pledged to place science at top of the national agenda, a commitment that we in forensic science embrace.

**Summary:**

In closing, I thank the Committee for the opportunity to address you and for your serious consideration of the report of the NAS Committee on Identifying the Needs of the Forensic Sciences Community. As we move forward we have to be conscious of the need for action, tempered by awareness of the current economic situation and by the importance of responding to the opportunity given to us by the NAS report in a way that will result in lasting and effective solutions. To that end, I have recommended a three-stage approach:

- **Immediate action** that uses existing federal resources to address scientific standards
- **Interim action** to evaluate strategic policy directions and strategies, and explore innovative solutions to areas such as education and research, and
- **Long-term action** to create a National Institute of Forensic Science (NIFS).

BIOGRAPHY FOR CAROL E. HENDERSON

- Professional affiliations:
  - Past President, American Academy of Forensic Sciences
  - Co-Chair Future of Evidence Committee, American Bar Association Science and Technology Law Section
  - Vice-Chair Scientific Evidence Committee, American Bar Association Science and Technology Law Section
  - Member, International Association of Chiefs of Police Forensic Committee.
- Founding director of the National Clearinghouse for Science, Technology and the Law (NCSTL). Professor Henderson planned and managed its development, which includes the only comprehensive, searchable database of science, technology and law in the world. (*www.ncstl.org*). NCSTL is the most effective source of information on science and the law, with hits from 128 countries. NCSTL also produces symposia, conducts community acceptance panels on topics such as less lethal technologies and produces bibliographies on science and technology issues.
- Recognized as an international authority on science and law, Professor Henderson has presented more than 250 lectures and workshops to thousands of forensic scientists, attorneys, judges, law enforcement and military personnel worldwide on the topics of scientific evidence, courtroom testimony, and pro-

fessional responsibility. She has lectured in Argentina, Australia, Canada, Finland, Germany, Hong Kong, Italy, Japan, Scotland, Spain and Taiwan.

- Professor Henderson has more than fifty publications on scientific evidence, law and ethics. She is an editor of the *Encyclopedia of Forensic and Legal Medicine* (2005), which received the Minty Prize from the British Medical Association. Her latest book, the 5th edition of *Scientific Evidence in Civil and Criminal Cases* was published in 2008. She serves on the editorial boards of the *Journal of Forensic Sciences,* the *Journal of Clinical Forensic Medicine,* and the *Forensic Science, Medicine and Pathology Journal.* She also serves on numerous working groups for the National Institute of Justice.
- Professor Henderson has appeared in both the popular and professional media, including National Public Radio, Fox National News, CBS "48 Hours," The John Walsh Show, Montel, TruTV, Court TV, the American Bar Association Journal and Lawyers Weekly USA.
- Professor Henderson received her J.D. degree from The National Law Center, George Washington University in 1980. Prior to receiving her J.D., she worked for the Federal Bureau of Prisons and the Department of Justice Criminal Division. She began her legal career as an Assistant United States Attorney in Washington, D.C.

Chair WU. Thank you, Ms. Henderson.

Mr. Hicks, please proceed.

**STATEMENT OF MR. JOHN W. HICKS, DIRECTOR, OFFICE OF FORENSIC SERVICES, NEW YORK STATE DIVISION OF CRIMINAL JUSTICE SERVICES (RET.); FORMER DIRECTOR, FBI LABORATORY**

Mr. HICKS. Thank you, Mr. Chair and Members of the Subcommittee. Thank you for the opportunity to be here to provide my perspectives on this whole study today.

As Mr. Marone did, I tried to group the 13 recommendations of the National Academy of Sciences' study into four categories. My categories are very similar to his, the first category being methods development and standardization. I think this is probably the most critical area where the needs are severe right now. The other category, laboratory accreditation and quality assurance, the third category, research and training, and the fourth, resource requirements, and those latter three categories Congress has already undertaken a number of initiatives that have helped the laboratories considerably under the DNA backlog programs and the Paul Coverdale Forensic Science Improvement Program. In my experience working with New York State over the last eight years, we had 22 laboratories operating within that state, and I can tell you that each of these laboratories benefits substantially from that, and relies on those funds to continue to improve their programs and operations. They are critical programs and I would hope that they would be continued.

Of course, the confidence in DNA technology was brought about in large part because the underlying developmental work that was done. We were fortunate at the time that work took place that it was a brand-new technology. It was quickly recognized, the significance and importance of the technology, for forensic science and so we had many agencies come together. The FBI, the National Institute of Justice and NIST [National Institute of Standards and Technology], among those agencies working with commissions and others around the country spent an enormous number of hours trying to work and address the various implementation issues. It

wasn't efficient but it did seem to get us to the right place in the end.

Of course, the National Academy committee expressed concerns, as Mr. Marone pointed out, with a lot of pattern recognition types of things: firearms identification, fingerprint matching, and so forth. I think it is significant to note that NIST has played an important role in those functions. They did a big study not only with respect to DNA technology, but did a huge study with respect to the Automated Fingerprint Identification System, which helped to identify the standards to help the system work more efficiently. And of course, that is a system relied upon every minute of every day by every police department in the country to carry out its work. They also performed a very helpful study with respect to a firearms database system to capture fired ammunition components and the image data from the markings on those bullets and data, and that has resulted in what is now called the NIBIN, National Integrated Ballistics Identification Network, and it is used widely by firearms examiners around the country. It is a good training tool to help begin to maybe generate leads in ongoing investigations. So NIST has played an important role in those two. Of course, with respect to toxicology and chemistry and general analytical services, NIST routinely provides standards that are used for traceability and quality control purposes when in those operations.

From my perspective, I think an expanded role for NIST represents the most effective and efficient way to bring about needed improvements in the forensics community. It would bring focus and it would draw on their core competencies, which of course relate to standards development and validation of work. I suspect there is a lot of work out there that if brought together—existing work out there brought together and sort of examined closely under great scrutiny, some NIST studies put together to round out the available data, I suspect that many of the troublesome questions that the Academy report found might be addressed fairly quickly through an organization like NIST.

It would be helpful, of course, for NIST to—I think the DNA model, while not necessarily all that efficient, did draw on collaboration between federal agencies that have some competencies in this area and had connections with the community. I think it would be very important of course for NIST to expand its relationship with the forensic community. One of the things that has evolved over the last few years has been what are called scientific working groups. And these are typically experts in different disciplines brought together to share their concerns and questions and issues that come up and it has been a very productive way to help promote standards. In fact, many of those groups have defined their own—started putting together information that helps define what the operating standards and procedures should be for their disciplines. What would be helpful is to expose these data to some good, heavy, rigorous scientific scrutiny as well.

So I think I will conclude with that. As I said, my perspective is that NIST provides an opportunity here to really help in the area which I think is the greatest need, and that is focusing on the standards development and the standardization aspects.

[The prepared statement of Mr. Hicks follows:]

PREPARED STATEMENT OF JOHN W. HICKS

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you today and to offer my perspective on the findings and recommendations found in the recently released report of the National Academy of Sciences (NAS), *Strengthening Forensic Science in the United States: A Path Forward.* The Academy was given a broad charge to assess the state of forensic practices across the country and to make recommendations for improvement. In addition to traditional forensic laboratory services, the scope of its review included functions of medical examiners and coroners in determining cause and manner of death.

The recommendations found in the NAS report fall into four broad categories:

(1) methods development and standardization; (2) laboratory accreditation and quality assurance; (3) research and training; and (4) resource needs. As described briefly below, a number of congressional initiatives over the past few years have directed much needed attention to resource needs and to forensic laboratory quality improvement issues, including laboratory accreditation and staff training. It is recommended that support for these initiatives be continued. It is clear, however, that additional steps are needed to address critical concerns related to methods development and validation, especially for forensic disciplines other than DNA analysis.

With regard to the forensic use of DNA technology, Congress has authorized a series of programs that provide resources needed to meet the unprecedented demand for testing services. These programs are administered by the National Institute of Justice and are intended to help eliminate testing backlogs and reduce case turnaround times, to provide defendants with access to post-conviction DNA testing, and to help assure that the technology is used effectively to identify missing persons.

With regard to "non-DNA" forensic laboratory services and medical examiners, legislation was enacted in 2000 which created the Paul Coverdell Forensic Science Improvement Program which awards grants to states and units of local government to help improve the quality and timeliness of forensic science and medical examiner services. Among other things, the Coverdell program calls for laboratory accreditation by recognized accrediting bodies and provides for staffing and training needs. To assure transparency in laboratory operations, especially when problems may be indicated, Coverdell also requires that there be an independent entity with authority to investigate allegations of malfeasance or misconduct by laboratory personnel. While working in New York State, it has been my experience that these programs have been effective in bringing needed improvements to the 22 State and local forensic laboratories across the State. It is strongly recommended that support for these programs be continued and expanded.

In the Senate report that led to the NAS study, and in the NAS report itself, forensic DNA technology was set apart from other forensic disciplines in terms of what is known of the robustness of the underlying research and the methods validation work that was conducted to support its applications in the criminal justice system. The confidence in forensic DNA technology is the result of the considerable efforts of scores of scientists in the public and private sectors, working with academic researchers and forensic science practitioners, to assess, validate and optimize the various DNA testing methods in use today. A national Technical Working Group was formed at the outset to facilitate communication among forensic practitioners and help advance the technology in a coordinated way. The Technical Working Group on DNA Analysis Methods (TWGDAM) was specifically cited in the DNA Identification Act of 1994 which authorized CODIS, the national DNA Database. This effort was driven by Congressional leaders and agency administrators who recognized the importance and potential of this emerging technology as an identification tool to solve crimes and assure justice in the courts. High level support and direction was essential to maintain a focus that would assure the standardized methods necessary for data compatibility to enable the mutual sharing of information. Key federal agencies that contributed to the development and validation of forensic DNA technology include the Federal Bureau of Investigation (FBI), the National Institute of Justice (NIJ) and the National Institute of Standards and Technology (NIST).

The NAS Committee expressed concern over the apparent lack of systematic research to validate the basic premises and techniques for forensic disciplines that have been in practice since before the emergence of DNA technology. Disciplines which drew particular attention in their report are those that rely, in large part, on pattern recognition techniques such as those used in the examination of fingerprints; firearms and fired ammunition components; tool marks; and handwriting, among others. For these and other "non-DNA" forensic techniques that are widely

used today, it would be helpful to identify and gather existing empirical studies, to conduct other studies as deemed necessary to update or supplement these data, and to put the information in a form that is readily disseminated within the relevant forensic and scientific communities. Based on these studies, appropriate standards should be developed or updated to assure the use of uniform and scientifically validated examination techniques by forensic practitioners. These appear to be areas of study for which the core competencies found in NIST are particularly well suited.

While perhaps best known for its work in industry, NIST has been actively involved with elements in the forensic community over the past decade and has made important contributions working collaboratively with other federal agencies, industry and academia. For example, the agency undertook a number of inter-laboratory and other studies pertaining to individual markers used in DNA identification which have helped guide the successful development and forensic application of this revolutionary technology. The results of these efforts are in daily use in public and private forensic DNA laboratories and NIST scientists have presented their work in academic courses in order to prepare the next generation of forensic scientists. They have also provided in-service training sessions and in addition, seminars at professional meetings across the country.

NIST has also performed studies designed to validate and improve the performance of large data systems used in criminal justice applications such as the Automated Fingerprint Identification System (AFIS), a vital system in continuous use by law enforcement and other agencies to resolve personal identification issues, and the National Integrated Ballistics Identification Network (NIBIN) which correlates imaged data from bullets and cartridge casings recovered during the course of criminal investigations. NIST provides standard reference materials for use by laboratories in private industry as well as public laboratories (including forensic laboratories). As new technologies continue to emerge with potential applications in forensic laboratories, NIST is uniquely positioned to facilitate communications between the forensic community and private industry to assure the timely and appropriate development and production of laboratory equipment, reagents and other supplies needed for implementing new techniques.

An expanded role for NIST represents the most effective and efficient way to bring about needed improvements in the forensic science community and to assure appropriate focus in the development of new technology opportunities that emerge in the future. The activities described above, and others that can be cited by officials from NIST, clearly demonstrate the agency's unique competencies which can be brought to bear more widely in the forensic community not only to validate current methods and practices, but also to define a structure which can guide a long-term process of continuous improvement. The DNA experience provides a useful model and a framework upon which to build. This framework includes working with other federal agencies such as the FBI and NIJ, and engaging established Scientific Working Groups for specific forensic disciplines. If charged with this role by Congress, it would be expected that NIST would establish a coordinating body to provide oversight and direction to the effort. This body might include officials from the criminal justice and crime laboratory communities, key professional associations, and established accrediting organizations such as the American Society of Crime Laboratory Directors—Laboratory Accreditation Board (ASCLD/LAB) and the American Board of Forensic Toxicology (ABFT).

## BIOGRAPHY FOR JOHN W. HICKS

From May 2000 to January 2008, Mr. Hicks was the Director of the Office of Forensic Services, New York State (NYS) Division of Criminal Justice Services. Responsibilities of the Office include oversight of the State DNA database and providing staff support to the NYS Commission on Forensic Science. The Commission sets mandatory accreditation standards for 22 State and local forensic laboratories operating in New York (eight of which perform forensic DNA analysis) and monitors laboratory compliance. The Office of Forensic Services also facilitates specialized technical training for laboratory and law enforcement personnel, and participates in the administration of federal and State grants to the laboratories.

Mr. Hicks was a Special Agent with the Federal Bureau of Investigation (FBI) from 1969 to 1994 and served for much of his career in various technical and administrative positions in the Laboratory Division. He held the position of Assistant Director in charge of the FBI Laboratory from 1989 to 1994. In 1994, Mr. Hicks became Deputy Director of the Alabama Department of Forensic Sciences and was charged, among other responsibilities, with establishing the DNA Databank program for the state.

Mr. Hicks has been actively involved in the development of national standards and supporting State and federal legislation for the use of DNA technology in criminal justice applications. He was appointed by Governors Pataki and Spitzer to the NYS Commission on Forensic Science, is a member of the American Academy of Forensic Sciences and the American Society of Crime Laboratory Directors. He is a former board member of the National DNA Advisory Board. Mr. Hicks holds a Bachelor's Degree in Chemistry from Arkansas State University and a Master's Degree in Public Administration from the University of Southern California. He completed the Program for Senior Managers in Government at the John F. Kennedy School of Government, Harvard University, and the FBI Executive Development Institute.

Chair WU. Thank you very much, Mr. Hicks.

Dr. Downs, please proceed.

**STATEMENT OF DR. JAMES C. UPSHAW DOWNS, FORENSIC PATHOLOGIST/CONSULTANT, COASTAL REGIONAL MEDICAL EXAMINER, GEORGIA BUREAU OF INVESTIGATION**

Dr. DOWNS. Chair Wu, distinguished Committee Members, it is indeed an honor and a privilege to be before you today. I speak today as a GBI [Georgia Bureau of Investigation] employee, a board-certified forensic pathologist, and former Director of the Alabama Department of Forensic Sciences, where I saw firsthand a lab system go from square one to full accreditation while facing a crushing backlog. Most importantly, I speak as a son who lost a mother suddenly and had to wait for answers, and when those answers came it left many in my family with more questions than solace.

I think the take-home lesson from the NRC [National Research Council] report is nothing we didn't already know. For years we had seen the initially maligned discipline of forensic DNA identification benefit from a focused look at the potential and the shortcomings of the science. Although some had been skeptical, especially at first, the end result was wide acceptance of the reliability and the validity of DNA science. We within the rest of the forensic system eagerly sought an independent assessment of where we all stood. The NRC report is, as Paul Harvey would say, "the rest of the story": overall, we are doing well but there is some room for improvement.

Of the recommendations in the report, there is little but agreement on almost everything. Most involved in the process feel standardization of reports and terminology, research into underlying principles and validity, addressing potential bias and error, establishment of testable metrics, proficiency testing, accreditation, certification, quality assurance, ethics, enhanced forensic education, and database inter-operability are all good things. The question today is how NIST might fit into the forensics picture.

Certainly I don't think anybody would doubt the technical merits of NIST and their track record of unparalleled success in regards to analytical laboratory standards. Their greatest strength lies in accuracy and precision—the metrics of testing. The NRC specifically reaches out, as it should, to NIST to partner in relevant areas where such measurement and testing are key considerations. Thus, in areas like standardization, research, underlying principles, validity, potential bias and error, et cetera, NIST can, and should, be involved. However, the day-to-day application of forensic testing means working with less-than-optimal and highly variable case-specific evidence and trying to obtain the best possible test results,

then reporting those findings to the appropriate entities. NIST is primarily a laboratory science body which does not fit well into the NRC call for significant research in the entirety of the forensics realm. The NIST excellence in laboratory standards and metrics does not translate well into the larger issues of accreditation and certification, practitioner professionalism, or administrative areas. Nor, quite honestly, is there likely to be buy-in from the forensic practitioners if they [NIST] did become more involved. We already have accreditation and certification. We have standard operating procedures in place. I don't think we need to reinvent the wheel.

Another concern that I have is, unfortunately, I think that NIST lacks an established history with regards to the complexities and intricacies of interactions of law enforcement, legal, and governmental entities so vital to the effectiveness of the forensic system as a whole. A related question would be: exactly under what branch of government is there a best fit for forensics? An important point here is while we may be scientists, those who use our reports are oftentimes not. They are judges, prosecutors, defense counsel, police, sheriffs, and civilians. They all share one key concern: they want an accurate, reliable answer and they want it quickly. These customers have different, sometimes not entirely interrelated needs. Does the investigative aspect of law enforcement needs or the adversarial tenor of the court determine how a case is to be analyzed? Unfortunately, questions are far easier than answers.

The same NRC that conducted this report called for professionalization of forensics, specifically death investigation, before, through the National Academies. The last time in 2003, but also a little further back—in 1928 and again in 1932. Perhaps it isn't surprising to see that change is slow to come. After all, what is 80 years that we have been waiting compared to an office, specifically the coroner, that dates to the 900s and was reformed in 1194. Those who live in the past are destined to stay there. I think the NRC was wise in recognizing that none of their goals, however well intentioned, can come about overnight. There are serious challenges, both jurisdictional and legal, to overcome.

Independence is also an important consideration. Within my agency, we are operationally independent, as it should be, and as the text of the NRC report clearly defines. I have testified many times before from the stand that I am neither pro-prosecution nor pro-defense, I am pro-truth. I don't have a dog in the fight. The adversaries in the courtroom are the attorneys. I am their guest.

In closing, I think the path forward for all forensic scientists as outlined in the National Academy of Sciences' report is best served by that old adage, "good enough seldom is." The American people deserve better, and I think perhaps Sir William Gladstone best summed it up: "Show me the manner in which a nation cares for its dead and I will measure with mathematical exactness the tender mercies of its people, their respect for the laws of the land and their loyalty to high ideas."

Thank you, Mr. Chair and Committee Members. I would be happy to answer any questions.

[The prepared statement of Dr. Downs follows:]

PREPARED STATEMENT OF JAMES C, UPSHAW DOWNS

Chairman Wu and distinguished Committee Members, it is indeed an honor and a privilege to appear before you today. As the lone Medical Examiner and death investigation professional among the witnesses, I believe I offer a unique perspective on several of the issues raised in the National Research Council (NRC)'s report. I speak here today as a practitioner, a board-certified Forensic Pathologist, and a member of several professional organizations (including The National Association of Medical Examiners (NAME)[1] and The American Academy of Forensic Sciences (AAFS).[2] I do not speak for these organizations but their views have certainly helped shape my opinions. I speak as someone who has seen the pinnacles of investigative success the present system has to offer and one who has seen shameful mistakes. Most importantly, I speak as a concerned citizen who genuinely desires the improvements the forensic sciences and all those who use those services deserve. I speak as a son who lost a mother suddenly and had to wait for answers—and when those answers came, it left many in my family with more questions than solace. For my father, he experienced the same fate a generation earlier when his mother had no examination conducted as a lay investigator deemed it "unnecessary."

I was asked to review the scientific and technical issues raised by the NRC Report on Forensic Sciences and how the National Institute of Standards and Technology might fit into that picture. I should like to address my remarks primarily to the discipline of Forensic Pathology and medicolegal death investigation (see recommendation #11), which I see as a microcosm of the issues involving the forensic Sciences as a whole. I think that perhaps Sir William Gladstone best summed it up: "Show me the manner in which a nation cares for its dead and I will measure with mathematical exactness the tender mercies of its people, their respect for the laws of the land, and their loyalty to high ideals."

The focus of the entire "status of forensics" to me comes down to uniformity and best practices (see NRC recommendation #2). A different quality of death investigation should not depend on where one has the misfortune of dying. Surviving family members and the courts should not be forced to wait because a motor vehicle crash victim didn't quite make it over the State line to a better jurisdiction. In order to ensure that all forensic autopsies are created equal, NAME developed and implemented Forensic Autopsy Performance Standards in 2006.[3] Experienced practitioners formulated guidelines that were carefully considered and adopted by the membership at large. The intent was to create a procedure whereby the technical aspects of the performance of the forensic autopsy were consistent from jurisdiction to jurisdiction in order to guarantee a quality product. Are there very real and very serious problems when best practices are not followed? One need only look at recent[4,5] events regarding autopsies by un-boarded, non-Forensic Pathologist examiners to see the consequences. Truly those who do not learn from the mistakes of the past are destined to repeat them.

When Forensic Medicine is practiced as it should be—thoughtfully, completely, accurately, and impartially—everyone benefits. The scientific foundation of medicine is unquestioned. Medicine fought some battles similar to those pointed out in The NRC report at the same point in the last century with end result being a revolution

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[1] The National Association of Medical Examiners (NAME) is the national professional organization of physician medical examiners, medical death investigators and death investigation system administrators who perform the official duties of the medicolegal investigation of deaths of public interest in the United States. NAME was founded in 1966 with the dual purposes of fostering the professional growth of physician death investigators and disseminating the professional and technical information vital to the continuing improvement of the medical investigation of violent, suspicious and unusual deaths. Growing from a small nucleus of concerned physicians, NAME has expanded its scope to include physician medical examiners and coroners, medical death investigators and medicolegal system administrators from throughout the United States and other countries.

[2] The American Academy of Forensic Sciences is a multi-disciplinary professional organization that provides leadership to advance science and its application to the legal system. The objectives of the Academy are to promote education, foster research, improve practice, and encourage collaboration in the forensic sciences.

[3] Forensic Autopsy Performance Standards, *http://thename.org/index.php?option=com_docman&task=cat_view&gid=45&Itemid=26*

[4] CSI: Mississippi, A case study in expert testimony gone horribly wrong, *http://www.reason.com/news/show/122458.html*

[5] Reason's Reporting on Steven Hayne and Mississippi's Criminal Forensics System, *http://www.reason.com/news/show/131242.html*

[6] The Flexner Report and the Standardization of American Medical Education, *http://jama.ama-assn.org/cgi/content/full/291/17/2139*

in medical education and practice.[6,7] The net result was enhanced confidence in how the science was applied. The other forensic disciplines are on a similar road to ours but at several different points on their journeys. I think that, in general, the scientific underpinnings are there but certainly the disciplines would benefit from a more formal structured review. Look at it this way, a race car driver can be incredibly proficient on the track. The net result of the NRC report is that the same racing champion now has to go back and get a driver's license to document that they can in fact do what they already do so well.

All the efforts to improve medicolegal death investigation are designed to enhance service delivery to those who rely on the results of the forensic autopsy. In addition to the obvious impact Forensic Pathology has on the justice system, Medical Examiners have important and sometimes under-recognized duties in public health, medical research, and homeland security/mass disaster preparedness. Recognition of potentially infectious diseases from the performance of the autopsy may assist to minimize illness and death. Injuries found at autopsy were a large part of the development of automotive seatbelts and airbags. By studying sudden deaths, certain commonalities may be found and medical science advanced. Our understanding of many deaths, including those resulting from violence, can protect the living, for example by identifying inherited diseases or dangerous drug combinations. In the arena of disaster preparedness, the Medical Examiner is responsible for the medical investigation in mass fatality incidents, including identification of victims and the determination of the cause and manner of death—the Medical Examiner makes the ultimate determination if a death was, in fact, a homicide. Another area in which the Medical Examiner's contributions may not be fully appreciated is one of the most significant—as "family physicians to the bereaved" and providing closure to untold numbers of surviving family members.

Quality is a goal, not a destination; as such one of the hallmarks of any good lab is CQI—continuous quality improvement. NAME concurs with the NRC (see recommendation #2) that such quality is essential. As part of the NAME accreditation, an office has to have a quality assurance program. Benchmarks of that quality were demanded by the NRC report—certification and accreditation.

As physicians, Medical Examiners are well familiar with the necessities of personal qualification, to include licensure and medical specialty board certification. In 1933, American Board of Medical Specialties (ABMS) began medical specialty certification. Their motto says it all: "Higher standards. Better care."

- Nearly 85 percent of all licensed physicians in the United States are certified by at least one ABMS Member Board.
- Certification by an ABMS Member Board is widely recognized as the gold standard in assessing physician qualification. Health care institutions, insurers, physicians and patients use ABMS Member Board certification status as an essential tool to judge that a physician has the knowledge, experience and skills to provide quality health care within a given specialty.[8]

Pathologists have been certified in the sub-specialty of Forensic Pathology by the ABMS for the past 50 yrs. NAME will only recognize a physician as a Forensic Pathologist if they are certified in Forensic Pathology by the ABMS. Of the full members of NAME, ~85 percent have their specialty boards and ~75 percent have their sub-specialty boards.[9]

Just as we believe individuals should have certain basic credentials, so too should lab systems. NAME pioneered the accreditation of medicolegal death investigation systems, commencing formally in 1975. It has accredited offices in cities all over the United States (such Atlanta, Miami, Los Angeles, and Houston); in State systems (New Mexico and Georgia), and other nations (Singapore). We do have a way to go yet, at present, only 49 Medical examiner Offices/systems are accredited with another 11 in progress.[10] Regardless, the recommendation that "All medical examiner offices should be accredited"[11] is a good one. In addition, targeting limited available funds (especially given the present budget constraints) is a good carrot to encourage

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[7] Flexner Report . . . Birth Of Modern Medical Education, *http://www.medicinenet.com/script/main/art.asp?articlekey=8795*

[8] ABMS FACT SHEET, *http://www.abms.org/News_and_Events/Media_Newsroom/pdf/ABMS_Fact_sheet.pdf*

[9] R. Hanzlick & V. Weedn/National Association of Medical Examiners

[10] National Association of Medical Examiners

[11] *Strengthening Forensic Science in the United States: A Path Forward,* The National Academies Press, Washington, D.C., February 2009.

[12] *Ibid.*

[13] *Ibid.*

compliance: "All federal funding should be restricted to accredited offices . . . or [those] that demonstrate significant and measurable progress in achieving accreditation within prescribed deadlines."[12]

Forensic pathologists are strong proponents of education and research. In addition to attaining basic qualifications, in order to maintain licensure physicians are required to undergo continuing education, attaining a specific number of hours of training annually (another general NRC recommendation). NAME holds two meetings each year and the AAFS one in order to provide the latest forensic medical advances to attendees from all medical specialties. The *American Journal of Forensic Medicine and Pathology,* the official publication of NAME is the oldest professional publication dedicated exclusively to the science of medicolegal death investigation. The AAFS' *Journal of Forensic Sciences* is a multi-disciplinary which includes pathology/biology. These and other specialty journals present the latest advances in the field, however, sorely needed ongoing research has been difficult to fund. I am personally involved in studies in the field of child abuse and have to rely on the generosity of one of my community's non-profit hospitals to conduct tests that would otherwise go undone. The NRC call ". . . to support research, education, and training in forensic pathology . . ."[13] must be heeded if we are to keep pace with the ever advancing field of clinical medicine and other scientific disciplines. Only by making Forensic Pathology a continuously intellectually challenging discipline can we attract the best and brightest to the field in order to make that promise of a brighter future a reality. Guidance is needed, as indicated in the recommendation that a medicolegal death investigation Scientific Working Group (SWG) to ". . . develop and promote standards for best practices, administration, staffing, education, training, and continuing education for competent death scene investigation and postmortem examinations,"[14] to include new technologies. Directed group efforts have produced vital information to provide high quality death investigation at "every scene, every time."[15] Similarly, training curricula targeted to the most difficult of death scenes, those involving infants[16] have sought uniformity to the investigation of these tragic cases.

One of the more controversial among the NRC findings would be the conversion to a nation-wide Medical Examiner system, replacing the existing political office of coroner present in many jurisdictions. Professionalization death investigation has been proposed by the same National Academies—most recently in 2003 through the Institute of Medicine,[17] but also a little further back by the in 1928[18] and again in 1932.[19] Perhaps it isn't surprising to see that change is slow to come, after all what's 80 years against an elected office dating to the 900's and which made its comeback in 1194![20] Those who live in the past are destined to remain there. In that context, "the goal of replacing and eventually eliminating existing coroner systems"[21] can be seen as an attempt to improve a presently "adequately" functioning system. We must recognize that the mission of the medicolegal investigation of death has changed over the years. What used to be considered primarily a function of the justice system (be it criminal or civil) is now much, much more: "The role of medical examiners and coroners has evolved . . . to a broader involvement that now significantly benefits the public safety, medical, and public health communities. It is foreseeable that the public health role of medical examiners and coroners may continue to grow and that, perhaps in the not too distant future, public health impact will surpass criminal justice as the major focus of medicolegal death investiga-

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[12] *Ibid.*

[13] *Ibid.*

[14] *Ibid.*

[15] Death Investigation: A guide for the Scene Investigator, *http://www.ncjrs.org/pdffiles/167568.pdf*

[16] Sudden, unexplained Infant death Investigation Curriculum Guide, *http://www.cdc.gov/SIDS/PDF/508SUIDIGuidelinesSingles.pdf*

[17] National Research Council. *Bulletin of the National Research Council,* No. 64: The Coroner and the Medical Examiner. Washington DC: National Research Council;1928.

[18] Institute of Medicine. Medicolegal Death Investigation System: Workshop Summary. Washington DC: National Academy of Sciences; 2003.

[19] National Research Council. *Bulletin of the National Research Council,* No. 87: Possibilities and Need for Development of Legal Medicine in the United States. Washington DC: National Research Council; 1932.

[20] CROWNER: Origins of the Office of Coroner, Prof. Bernard Knight, CBE, *http://www.britannia.com/history/coroner1.html*

[21] *Strengthening Forensic Science in the United States: A Path Forward,* The National Academies Press, Washington, D.C., February 2009.

tion in the United States."[22] We can do better, but in order to do so, we must first understand the issue.

Typically death investigation is handled at the State or usually local level. No two systems are the same, even though many are similar. Of the 3,137 U.S. counties, roughly one-third (960) are true Medical Examiner counties without Coroners. These fall into four basic models: true State Medical Examiner (19 states—697 counties), pure County Medical Examiner (two states—98 counties), pure District (Regional) Medical Examiner (one state—67 counties), and sporadic (mixed) Medical Examiner (14 states—98 counties).[23] One problem is terminology—for example some states use the term "medical examiner" but do not require that person to be a pathologist. In short, in order to fix this one part of the overall "forensic system," significant restructuring of operations and local, State, and federal laws would be required.

In common usage, the terms Medical Examiner and Coroner are used interchangeably by many. In reality, there is a world of difference. A Medical Examiner in the purest sense is a physician, who after completing medical school continues training four or five more years in the field of General (also known as "Hospital") Pathology. Following that, are one to two years of specialized subject matter training in Forensic pathology. Following that are an intensive three day written and practical board examination in General Pathology followed by a one-day exam in Forensic Pathology. Compare that with the basic qualifications of the coroner, which are election to the office, often without any medical background or training at all. Their medical education is either on-the-job or yearly seminars on selected topics. I ask you—should the unfortunate instance arise, whom would you prefer perform this most important medicolegal examination on your loved one and then to testify about it in court? Who should be in charge of that death investigation system? With all due respect and with no offense intended, I do not believe a cab driver should be directing brain surgery. NAME agrees with the NRC that "All medicolegal autopsies should be performed or supervised by a board certified forensic pathologist."[24] As of now, there are approximately 245 titular or de facto chief medical examiners in the U.S. In reality, only ~160 of those meet NAME's definition of a Forensic Pathologist.[25] There are only ~400 active, full-time practicing Forensic Pathologists in the U.S.[26] In 2008 at the 126 Medical schools in the U.S. and 8,589 Medical Training Programs (representing 141 specialties) and 18,372 new medical students, only 37 new physicians entered the field of Forensic Pathology.[27]

Personally, I have worked with some excellent coroners who were dedicated and diligent. I suggest we not throw the baby out with the bath water. It is obvious that there insufficient Medical Examiners now and for the near-term future to simply flip a switch off on the Coroner system. Working with appropriate stakeholders, I would propose we roll the present functions of the traditional County Coroner into those of the Medical Examiner's office and utilize these already functioning professionals as lay investigators within that Medical Examiner system. This has the advantage of reduced costs and more rapid implementation. Obviously, those directly involved would have to have buy-in.

In order to achieve the goal of timely delivery of the highest quality forensic service to our citizens, we must have sufficient resources to make sure it happens. We must increase the numbers of trained Forensic Pathologists (and all other forensic practitioners) and strive for uniformity in the process of death investigation. Estimates indicate that twice the existing number of Forensic Pathologists would be needed to fully staff a true Medical Examiner system across the entire country. The NRC indicated that "Congress should appropriate resources to . . . support research, education, and training in forensic pathology."[28] If we want more people in the field, we need to recruit them early and retain them. Toward that end, the report made a bold proposal, that ". . . medical student loan forgiveness and/or fellowship support, should be made available to pathology residents who choose forensic pathology as their specialty."[29] As someone over twenty one years out of medical school and with my oldest child graduating college and my second starting, I am

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[22] Medical examiners, coroners, & public health: a review & update, *Arch Path Lab Med.* 2006 Sep; 130(9):1274–82.

[23] R. Hanzlick & V. Weedn/National Association of Medical Examiners

[24] *Strengthening Forensic Science in the United States: A Path Forward,* The National Academies Press, Washington, D.C., February 2009.

[25] R. Hanzlick & V. Weedn/National Association of Medical Examiners

[26] *Ibid.*

[27] R. Hanzlick, AAFS Pathology/Biology Annual Luncheon, from *JAMA,* September 10, 2008.

[28] *Ibid.*

[29] *Strengthening Forensic Science in the United States: A Path Forward,* The National Academies Press, Washington, D.C., February 2009.

proud to report that they have no outstanding student loans—but that their father could say the same!

In addition to the staffing issues, conversion to a nationwide Medical Examiner system will be expensive, as will be implementation of all the "forensics system" improvements called for by the NRC. "Funds are needed to build regional medical examiner offices, secure necessary equipment, improve administration, and ensure the education, training, and staffing of medical examiner offices. Funding could also be used to help current medical examiner systems modernize their facilities to meet current Centers for Disease Control and Prevention-recommended autopsy safety requirements."[30] As the panel's charge did not include budgetary issues, the inconvenient "how to pay for it" was left out of the mix.

Independence is also an important consideration. As my regular job falls under the umbrella of a law enforcement agency (the Georgia Bureau of Investigation), some might see that I have a pro-police bias. In reality, as I have testified from the stand many times before, I am neither pro-prosecution nor pro-defense; I am pro-truth. Within my agency, we are operationally independent, as it should be. I have worked in four different models of death investigation administration: private contractor, university employee, independent State agency, and law enforcement agency. I have found the best support I have ever had in the latter system. That those within law enforcement (as in the courts) would be interested in the results of my examinations is hardly surprising. Truth be told, I have never dealt with any law enforcement officer who wanted me to force a call or modify an opinion to suit some clandestine purpose. Quite the contrary, my experience has been that those police agencies who rely on my reports to determine if a case should be further scrutinized are understaffed and underfunded and are looking for guidance into how to best manage their own scarce investigative resources.

As for the science, an important distinction should be made between *conventional* science and *forensic* science. Ultimately, in the latter case the data must be available for courtroom presentation. As such, what might be considered intra-disciplinary differences of opinion in the interpretation of test results take on a whole new light. The objective forensic observer must not only perform the testing neutrally but must also report it likewise. Australia has already established (and revised five times) Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia.[31] The intent is to make the expert an impartial finder of scientific fact and to impartially report those findings and their resultant opinions to the court. I believe that impartiality and fairness are essential, test results should be just that—good or bad for whichever side, they should be solidly based and then should be admitted as a matter of course in accordance with procedures. I remember the day when DNA evidence was challenged almost incessantly and now a case is almost deemed questionable if there isn't DNA evidence. The good folks at the Innocence Project have show first-hand how valuable good forensic evidence can be—for either side in our adversarial legal system.

The NRC was wise in recognizing that none of their goals, however well-intentioned, can come about overnight. We have serious jurisdictional and legal challenges to overcome. "This requirement should take effect within a timeframe to be established . . ., following consultation with governing State institutions."[32] It might be tempting to find a quick fix to the issue of oversight for the forensic sciences by placing it under existing entity. I do not believe that is in the spirit of what the NAS report called for:

> "The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country. This can only be done with effective leadership at the highest levels of both Federal and State governments, pursuant to national standards, and with a significant infusion of federal funds . . .. What is needed to support and oversee the forensic science community is a new, strong, and independent entity that could take on the tasks that would be assigned to it in a manner that is as objective and free of bias as possible-one with no ties to the past and with the authority and resources to implement a fresh agenda."[33]

I do not think it in our best interests to try to "add on" to an existing structure, with its own extant biases and entrenched operational protocols. Such an institu-

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[30] *Ibid.*

[31] *http://www.fedcourt.gov.au/how/prac_direction.html*

[32] *Ibid.*

[33] *Strengthening Forensic Science in the United States: A Path Forward,* The National Academies Press, Washington, D.C., February 2009.

tionalized mindset would not seem to provide us the optimal chance to create a better way. The NRC report called for a new, independent entity for a reason—past experience. We have an opportunity to learn from past mistakes and to emulate our successes as we move forward. If we are to take home the messages of this NAS report, we should not cherry pick what we want to hear and disregard the parts we think we might do better without. This is one of those rare times in life where we have the opportunity to get it right from the start as we follow a new, better path armed with the experiences that will ensure our best chances for success.

As for an independent model, there exists an independent National Institute of Forensic Science (NIFS)[34] in Australia. The NIFS core functions include:[35]

- Sponsor and support research in forensic science;
- Advise on and assist with the development and coordination of forensic science services;
- Gather and exchange forensic information;
- Support, coordinate and conduct training programs in forensic science; and
- Conduct relevant quality assurance programs.

Additional present and future activities of NIFS include:[36]

- Raising the profile of forensic science; and
- Constructive and accountable resource management.

Created in 1991 as a National Common Police Service, the agency governance includes a Board of Control (comprised of three Police Commissioners, three Forensic Laboratory Directors, and a distinguished University Provost) and a Panel of Advisors (scientists, police, legal practitioners, and medical practitioners). The multi-disciplinary nature of their directorate should not be missed, particularly the law enforcement and legal communities shoulder-to-shoulder with the scientific and medical; ". . . diversity makes for a rich tapestry, and we must understand that all the threads of the tapestry are equal in value no matter what their color."[37] I am not well-acquainted with the existing NIFS but it certainly does sound as though it addresses many of the issues brought up in the NRC report. I suggest we might well benefit from more detailed analysis of this existing model as we venture to build our better mouse trap.

As for the National Institute of Science and Technology (NIST) specifically, I feel that there are their continued efforts to improve forensics will remain beneficial. In fact, the NRC report calls for their involvement in setting accreditation and certification standards.[38] While NIST clearly has a demonstrated record of unsurpassed technical in many scientific areas, it lacks an established history with regard to the complexities and intricacies of the interaction of law enforcement, legal, and governmental issues so vital to operations within the forensics environment. The day-to-day application of forensics means working with less than optimal evidence and trying to obtain the best possible result, then reporting to the appropriate entities. The NIST expertise in laboratory standards does not translate well into the larger issues of accreditation & certification implementation, practitioner professionalism and ethics, or administrative areas. Nor, quite honestly, is there likely to be an easy buy-in from the forensics system as a whole given the shortcomings enumerated.

I look forward to working with all those with a sincere interest in providing timely delivery of the highest quality forensic science services to all. With continued effort, the NAS report is a significant step in that direction. In closing, I believe that the Path Forward for forensic sciences, as outlined in the national Academy of Sciences report is best served by that old adage, "good enough seldom is." The American people deserve better.

## BIOGRAPHY FOR JAMES C. UPSHAW DOWNS

James Claude Upshaw ("Jamie") Downs, M.D., is coastal Georgia's first Regional Medical Examiner.

He has been continuously employed as a Medical Examiner since 1989 and was Alabama's State Forensics Director and Chief Medical Examiner from 1998 to 2002. Dr. Downs has lectured extensively in the field of forensic pathology and has pre-

[34] *http://www.nifs.com.au/*
[35] *http://www.nifs.com.au/NIFS/NIFS_frame.html?about.asp&1*
[36] *Ibid.*
[37] Maya Angelou
[38] *Strengthening Forensic Science in the United States: A Path Forward,* The National Academies Press, Washington, D.C., February 2009.

sented at numerous national and international meetings in the fields of anatomic and forensic pathology. He is a consultant to the FBI Behavioral Science Unit in Quantico, Virginia, having authored four chapters in their manual on *Managing Death Investigation* and was primary author of the FBI's acclaimed *Forensic Investigator's Trauma Atlas.* He has authored several books and chapters in the field of forensic pathology and child abuse, including *Abusive Head Trauma in Infants and Children: A Medical, Legal & Forensic Reference with CD–ROM* and *Child Fatality Review: A Clinical Guide and A Color Atlas* (in press). He has lectured regularly at the National Forensic Academy and at the FBI's National Academy. Areas of special interest include child abuse and police use of force. Professional activities have included service on numerous professional boards and committees.

He has testified in numerous State and federal courts, as well as before committees of the United States Senate and House of Representatives.

Dr. Downs is on the Board of Advisors for the Law Enforcement Innovation Center at the University of Tennessee, the Board of Directors of the National Association of Medical Examiners, the Board of Directors of the Consortium of Forensic Science Organizations (Vice Chair), and the National Forensic Science Technology Center. He also serves on the Forensic Committee of the International Association of Chiefs of Police.

Chair WU. Thank you very much, Dr. Downs.

Mr. Neufeld, please proceed.

## STATEMENT OF MR. PETER J. NEUFELD, CO-FOUNDER AND CO-DIRECTOR, THE INNOCENCE PROJECT

Mr. NEUFELD. Good morning, Mr. Chair and Members of the Committee. My name is Peter Neufeld. I am the Co-Founder and Co-Director of the Innocence Project, and certainly I will be the first to admit, if it wasn't for DNA, I wouldn't be here and there would be no Innocence Project because it was DNA that was responsible for the exoneration of 233 men and women in this country who were wrongly convicted. Unfortunately, our research into these cases suggests that 50 percent of them were wrongly convicted because of the use of either an unvalidated or improper forensic science testimony at their original trials, and it is our familiarity with DNA which leads me to take issue with some of the remarks made by some of the other speakers.

The underlying success and virtue of DNA and its robustness does not come primarily from the fact that the FBI or NIJ or NIST worked on tweaking it to make it more user friendly in the crime labs in America. The underlying robustness of DNA comes from the fact that for 20 years before it was ever used in a courtroom, DNA was being broadly researched—applied research, basic research, for research laboratories, for medical applications of DNA, and that is the uniqueness of DNA, if you will, with respect to these other forensic disciplines that come under such harsh criticism in the NAS report, that these other disciplines were created first and foremost for law enforcement and so they never went through that kind of basic or applied research that DNA enjoyed.

And for our clients, our exonerees, the findings of the NAS report are not a total surprise. We knew about this anecdotally but fortunately it was the NAS report that looked at it methodically and scientifically and arrived at the conclusions that are reached. And one of the key conclusions that are reached is that "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." That is the finding of the re-

port, and to us, that is not a surprise because so many of our clients were convicted because of less than reliable, or less than validated, forensic science. I hold out Kennedy Brewer as an example. He is mentioned in the written testimony. Kennedy Brewer was convicted because a bite mark expert in Mississippi said insect marks on this little three-year-old girl's body were not only bite marks but were bite marks that came from Kennedy Brewer to the exclusion of everybody on the planet. Years later, even though this man was sentenced to death for a crime he didn't convict, DNA on the semen recovered from her not only exonerated him but identified the real perpetrator, a man named Justin Albert Johnson. And the sad thing in this case is that 18 months earlier another three-year-old girl was killed in the same community and once again the same bite mark expert said that someone named Lavon Brooks was responsible for those bite marks and therefore must have been responsible for that murder. Justin Albert Johnson was nearly suspect in that other case, but because of the bite mark evidence everybody ignored Mr. Johnson and focused on the wrong person.

Every time the police department or the forensic scientists focus on the wrong person, the real bad guy is still out there, as in this case, committing other horrible crimes. In this case, it was a rape and murder of a three-year-old girl. What we found in the 230 exonerations are 100 instances where the real perpetrator was ultimately identified and during those intervening years the real perpetrator committed many serious murders and violent rapes. So when we are talking about making reforms here, we are talking about not only helping the wrongly convicted, we are helping improve public safety for all Americans. And when people say oh, this is old science, they should know that we tried to do an informal survey here and we found out that there are still 200 to 300 of these bite mark experts in the last four to five years who were testifying in these kinds of cases. Look at Brendan Mayfield and look at the language in this report on fingerprint examination, and what it says in the report is that the ACE–V [Analysis, Comparison, Evaluation, and Verification] does not guard against bias, is too broad to ensure repeatability and transparency, and does not guarantee that two analysts following it will obtain the same results. Well, no wonder two FBI agents in the Brendan Mayfield case swore on affidavits that they were 100 percent certain that the fingerprints on the bombing device bag in Madrid came from this attorney named Mayfield but they were 100 percent wrong.

The problem is, when you look at the language in the NAS report, if you were not looking at forensic science but instead you were looking at medicine, you would outlaw those products or you would pull them from the shelf, but historically we have always had this double standard for forensic science on the one hand and medical science on the other, and that is what the NAS report set out to address, to treat it with the same kind of rigor, and wherever you decide to place this thing, Mr. Chair and Members of the Committee, the key principles are there has to be an aggressive research agenda, something that has always been lacking in forensic science. There has to be an oversight entity concerned with validity and reliability, something that has always been lacking in forensic science. There has to be some government oversight of quality as-

surance, of accreditation, of certification. If those recommendations are implemented, you will have science-based prosecutions, you will have fewer wrongful convictions and you will have a robust forensic science industry that becomes an incubator for innovation and technology, not just in the United States but throughout the world. Thank you.

[The prepared statement of Mr. Neufeld follows:]

PREPARED STATEMENT OF PETER J. NEUFELD

Thank you Chairman Gordon, Ranking Member Hall, and Members of the Committee. My name is Peter Neufeld and I am the Co-Director of the Innocence Project, affiliated with the Cardozo School of Law, which Co-Director Barry C. Scheck and I founded in 1992. The project is a national litigation and public policy organization dedicated to exonerating wrongfully convicted people through DNA testing and reforming the criminal justice system to prevent future miscarriages of justice.

Without the development of DNA testing, there would be no Innocence Project; 233 factually innocent Americans would remain behind bars, and 17 of those 233 could have been executed. Our research into the causes of wrongful conviction reveals that police and prosecutors' reliance on unvalidated and/or improper forensics was the second greatest contributing factor to those wrongful convictions. Our analysis regarding wrongful convictions involving unvalidated or improper forensic science that were later overturned through DNA testing is attached to this testimony.

Given what those DNA exonerations have taught us about the shortcomings of forensic science, the Innocence Project is extremely thankful to Congress for authorizing and appropriating funds to establish the National Academies of Science Committee on Identifying the Needs of the Forensic Science Community. By convening some of the very best minds in the Nation to focus on the needs and shortcomings of forensic practice and how to remedy them, the Nation has been provided with both an alarm regarding the serious shortcomings that exist regarding forensic evidence, and a roadmap to addressing the major improvements in the forensic system necessary to ensure the most accurate evidence—and therefore justice—possible.

I am also extremely pleased to participate in this hearing reviewing the recommendations and conclusions of the National Academies' report *Strengthening Forensic Science in the United States: A Path Forward.* Thank you for the invitation to testify before you today.

While the Innocence Project is known for its association with DNA evidence, we are forever cognizant of the importance of non-DNA forensic evidence to determinations of justice. Our criminal justice system relies heavily on non-DNA forensic techniques. The Bureau of Justice Statistics' 2005 Census of Publicly Funded Forensic Crime Laboratories reported that new lab requests for DNA work consist of only approximately three percent of all of all new requests for lab work.

As our review of DNA exonerations shows, unvalidated and improper forensics contributed to approximately 50 percent of wrongful convictions overturned by DNA testing. In the DNA exonerations alone, we have had wrongful convictions based on unvalidated or misapplied serological analysis, microscopic hair comparisons, bite mark comparisons, shoe print comparisons, fingerprint comparisons,[1] forensic geology (soil comparison), fiber comparison, voice comparison, and fingernail comparison,[2] among the many forensic disciplines that have produced these tragic miscarriages of justice in our courts. There have even been a few innocents whose convictions relied, in part, on shoddy DNA testing in the early years of its forensic application. It comes as no surprise to us that the NAS concluded: "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."[3] The overarching problem has been that all too frequently, these other forensic disciplines have been improperly relied upon to connect our innocent clients to crime scene evidence.

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[1] Garrett and Neufeld, *Virginia Law Review,* Vol. 95, No. 1, March 2009, p. 8.

[2] *Ibid.,* p. 13.

[3] *Strengthening Forensic Science in the United States: A Path Forward,* Committee on Identifying the Needs of the Forensic Science Community, The National Academies Press (2009), p. 5–5.

Just as DNA exonerations reveal inherent shortcomings in other forensic disciplines, the evolution and regulation of DNA in the forensic setting (from basic research to crime lab and to casework) contrast starkly with the near total absence of validation and demonstrable reproducibility for many other forensic technologies. Long before there was a national forensic DNA testing program, the National Institutes of Health (NIH) and others funded and conducted extensive and relevant basic research and followed it with applied research. Scientists appreciated the challenge of transferring the technology from research lab to clinical lab and from clinical lab to crime lab. The forensic methods were validated for case work, and individual crime labs further validated the kits and protocols for use in their own laboratory settings.

In contrast to DNA, the vast majority of non-DNA forensic assays, which have often been erroneously used to suggest an individual match, have never been subjected to basic scientific research or federal review. Moreover, as pointed out by the NAS, neither the FBI nor the National Institute of Justice have, over the years, "recognized, let alone articulated, a need for change or a vision for achieving it. Neither has full confidence of the larger forensic science community. And because both are part of a prosecutorial department of the government, they could be subject to subtle contextual biases that should not be allowed to undercut the power of forensic science."[4] Without a push for vigorous adherence to the scientific method, innocent people have gone to prison or death row while the real perpetrators remained at liberty to commit other violent crimes.

The NAS report references several of the forensic disciplines which have gone unregulated and without proper validation and reliability:

- **Hair Comparisons:**
  "No scientifically accepted statistics exist about the frequency with which particular characteristics of hair are distributed in the population. There appear to be no uniform standards on the number of features on which hairs must agree before an examiner may declare a "match."[5] The report notes that along with the imprecision of microscopic hair analysis, the "problem of using imprecise reporting terminology such as 'associated with,' which is not clearly defined and which can be misunderstood to imply individualization."[6] The committee found no scientific support for the use of hair comparisons for individualization in the absence of nuclear DNA. Microscopy and mtDNA analysis can be used in tandem and may add to one another's value for classifying a common source, but no studies have been performed specifically to quantify the reliability of their joint use."[7]

**Jimmy Bromgard** spent 14.5 years in prison for the rape of an eight-year-old girl that he did not commit. The semen found at the crime scene could not be typed, so the forensic case against Bromgard came down to the hairs found at the crime scene. The forensic expert, Arnold Melnikoff, a hair examiner and Laboratory Manager of the State crime lab in Montana, testified that the head and pubic hairs found at the scene were indistinguishable from Bromgard's hair samples. He claimed that there was a one in 100 chance of a head hair "matching" an individual, and a one in 100 chance of a pubic hair "matching"—and then he multiplied these statistics to say that there was less than a one in 10,000 chance that the hairs did not belong to Bromgard. This damning testimony was also fraudulent: there has never been a standard by which to statistically match hairs through microscopic inspection. The criminalist took the impressive numbers out of thin air.

- **Bite mark Comparisons:**
  "Although the methods of collection of bite mark evidence are relatively noncontroversial, there is considerable dispute about the value and reliability of the collected data for interpretation. Some of the key areas of dispute include the accuracy of human skin as a reliable registration material for bite marks, the uniqueness of human dentition, the techniques used for analysis, and the role of examiner bias . . .. Although the majority of forensic odontologists are satisfied that bite marks can demonstrate sufficient detail for positive identification, no scientific studies support this assessment, and no large population studies have been conducted. In numerous instances, experts diverge widely in their evaluations of the same bite mark evidence, which has led to questioning of the value and scientific objectivity of such evidence . . .. Bite

[4] *Ibid.,* p. S–12.
[5] *Ibid.,* p. 5–25.
[6] *Ibid.,* p. 5–26.
[7] *Ibid.,* p. 5–26.

mark testimony has been criticized basically on the same grounds as testimony by questioned document examiners and microscopic hair examiners. The committee received no evidence of an existing scientific basis for identifying an individual to the exclusion of all others." [8]

**Kennedy Brewer** spent seven years on death row in Mississippi for the murder of a three-year-old girl that he did not commit. An independent examiner, forensic odontologist, Dr. Michael West, analyzed several marks on the child's body that he testified were bite marks inflicted by Brewer, and then only by his top two teeth. West said that "within reasonable medical certainty," Brewer's teeth caused the marks, and then explained that "reasonable medical certainty" meant that Brewer was the source of the marks. The "bite marks" turned out to be caused by insects in the pond where the girl's body was discovered and by the natural sloughing of skin a body experiences when left in the water for several days.

- **Fingerprint Comparisons:**
  "ACE–V provides a broadly state framework for conducting friction ridge analyses. However, this framework is not specific enough to qualify as a validated method for this type of analysis. ACE–V does not guard against bias; is too broad to ensure repeatability and transparency; and does not guarantee that two analysts following it will obtain the same results.[9] Errors can occur with any judgment-based method, especially when the factors that lead to the ultimate judgment are not documented.[10] As was the case for friction ridge analysis and in contrast to the case for DNA analysis, the specific features to be examined and compared between toolmarks cannot be stipulated a priori." [11]

Although not a DNA exoneration, **Brandon Mayfield**'s case was referred to in the NAS Committee's report as, "surely signal caution against simple, and unverified, assumptions about the reliability of fingerprint evidence." [12] Brandon Mayfield was arrested as a material witness in the Madrid Bombings of March 2004. Several FBI fingerprint experts "matched" his print to fingerprints lifted from a plastic bag containing explosive material found at the crime scene. Mayfield, a Portland Oregon lawyer, who had converted to Islam and married an Arab woman, had his prints in the national database because years earlier he had served in the U.S. armed forces. Mayfield's print was one of 20 prints returned from a search of the national Automated Fingerprint Identification System (AFIS) as being very similar to the crime scene print. Following a further visual inspection of the 20 prints, two FBI fingerprint experts swore in affidavits that they were 100 percent certain that the crime scene prints belonged to Mayfield. When the Spanish police ultimately arrested the real source of the fingerprint, the FBI initially defended their "mistake" as the result of poor digital image. Obviously, the two FBI experts could not have been 100 percent certain if the image was poor. Several major investigations followed, including one conducted by the Inspector General of the Department of Justice.[13]

The NAS report revealed similar lapses in validation and inappropriate associations in several other forensic disciplines:

- **Shoe Print Comparisons:**
  "[I]t is difficult to avoid biases in experience-based judgments, especially in the absence of a feedback mechanism to correct an erroneous judgment.[14] [C]ritical questions that should be addressed include the persistence of individual characteristics, the rarity of certain characteristic types, and the appropriate statistical standards to apply to the significance of individual characteristics." [15]

- **Fiber Comparisons:**
  "Fiber examiners agree, however, that none of these characteristics is suitable for individualizing fibers (associating a fiber form a crime scene with one, and only one, source) and that fiber evidence can be used only to associate a given fiber with a class of fibers." [16]

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[8] *Ibid.,* p. 5–37.
[9] *Ibid.,* p. 5–12.
[10] *Ibid.,* p. 5–13.
[11] *Ibid.,* p. 5–21.
[12] *Ibid.,* p. 3–16.
[13] *Ibid.,* footnotes 75 and 76, which indicated that contextual bias and confirmation bias played an important role in the misidentification.
[14] *Ibid.,* p. 5–17.
[15] *Ibid.,* p. 5–18.
[16] *Ibid.,* p. 5–26.

- **Other Pattern/Impression Evidence: Fingernail Comparison, Voice Comparison, Forensic Geology:**

  "Although one might argue that those who perform the work in laboratories that conduct hundreds or thousands of evaluations of impression evidence develop useful experience and judgment . . . the community simply does not have enough data about the natural variability of those less frequent impressions, absent the presence of a clear deformity or scar, to infer whether the observed degree of similarity is significant.[17] Also, little if any research has been done to address rare impression evidence. Much more research on these matters is needed."[18]

The aforementioned disciplines all require further validation. The Innocence Project agrees with the NAS report regarding what is needed: "(1) information about whether or not the method can discriminate the hypothesis from an alternative, and (2) assessment of the sources of error and their consequences on the decisions returned by the method."[19]

It is critical that we all understand the real world consequences of the forensic problems I and the NAS have discussed. These were not incidents reflective of one bad actor, or one wayward jurisdiction; our review of the Nation's DNA exonerations showed that seventy-two forensic analysts from 52 different labs, across 25 states had provided testimony that was inappropriate and/or significantly exaggerated the probative value of the evidence before the fact finder in either reports or live courtroom testimony. According to the NAS Forensic Committee's report, the shortcomings in education, training, certification, accreditation, and standards for testing and testifying that contributed to wrongful convictions in those cases threaten the integrity of forensic results across virtually all non-DNA forensics.

It is important to recognize that these 233 individuals represent just the tip of the iceberg. In the vast majority of cases DNA is simply useless to indicate innocence or guilt—in fact, DNA is estimated to be probative in only 10 percent of all murder cases, and a far lower percentage of all criminal cases. What's more, in most cases where convicted people seek our representation to use post-conviction DNA testing to prove their innocence, we don't have the opportunity to conduct a DNA test because the biological evidence has either been lost or destroyed. And in some cases, when we have the evidence and testing it can prove innocence, the state simply refuses to allow the test that can indicate the truth.

DNA testing has become the gold standard in forensics because it is science-based and tested. It was discovered through basic research and later applied to clinical DNA diagnostics, developing under the same scrutiny given to medical devices. So when it entered the courtroom, there was already a tremendous body of literature in highly respected scientific journals, amassed over a number of years, to support and validate its accuracy. Subsequently, the National Research Council twice convened some of the top scientists from leading research universities to discuss not only the scientific application of DNA in courts, but also to validate the statistical implications of the data that was produced.

Non-DNA forensic assays have not been scientifically validated, and there is no formal apparatus in place to do so for developing forensic technology. Though the technology has changed over time, the sources of human error, misinterpretation, and misconduct have not. Most of the assays used in law enforcement have no other application; they were developed for the purpose of investigation, prosecution and conviction and took on a life of their own without being subjected to the rigors of the scientific process. Essentially, the assays were simply accepted as accurate. Many of these forensic disciplines—some of which are experience-based rather than data-based—went online with little or no scientific validation and inadequate assessments of their robustness and reliability. No entity comparable to the Food and Drug Administration ever scrutinized the forensic devices and assays, nor were crime laboratories subject to mandatory accreditation and forensic service practitioners subject to certification. Enforceable parameters for interpretation of data, report writing, and courtroom testimony have also never been developed.

While there is research and work that establishes what needs to be done to improve various forensic practices, the fact is that no existing government entity, nor the forensics community itself, has been able to sufficiently muster the resources nor focus the attention necessary to use the existing information as a launching pad to comprehensively improve the integrity of non-DNA forensic evidence. The NAS report is the first step—and a tremendous one—toward fully establishing and acting

[17] *Ibid.,* p. 5–17.
[18] *Ibid.,* p. 5–18.
[19] *Ibid.,* p. 4–2.

upon what we already know. From the perspective of justice and public safety, it is tragic that it has taken this long to act on the desperate need to improve the quality of forensic evidence. Given the clear and comprehensive message delivered by the NAS on this subject, further delay would be unconscionable.

The report calls for Congress to act, strongly and swiftly. This is because as I speak, many of these assays and technologies are being used in investigations, prosecutions and convictions daily everywhere in this country, despite their potential to mislead police, prosecutors, judges and juries away from the real perpetrators of crime. Although the conventional wisdom once stated that a sound defense and cross-examination would enable courts to properly assess the strength of forensic evidence, the Report unequivocally states and the post-conviction DNA exoneration cases clearly demonstrate that scientific understanding of judges, juries, defense lawyers and prosecutors is wholly insufficient to substitute for true scientific evaluation and methodology. It is beyond the capability of judges and juries to accurately assess the minutiae of the fundamentals of science behind each of the various specific forensic assays in order to determine the truth in various cases, and it is an unfair and dangerous burden for us to place on their shoulders. Indeed, the NAS report deems that "judicial review, by itself, will not cure the infirmities of the forensic science community."[20]

It is absolutely clear—and essential—that the validity of forensic techniques be established "upstream" of the court, before any particular piece of evidence is considered in the adjudicative process. For our justice system to work properly, standards must be developed and quality must be assured before the evidence is presented to the courts—or even before police seek to consider the probative value of such testing for determining the course of their investigations. There is simply no substitute for requiring the application of the scientific method to each forensic assay or technology, as well as parameters for report writing and proper testimony, as part of the formal system of vetting the scientific evidence we allow in the courtroom.

The Innocence Project whole-heartedly supports the primary recommendation of the National Academy of Sciences' report to create a federal National Institute of Forensic Sciences. We believe that federal oversight body must conduct research into the scientific validity and reliability of forensic disciplines and set standards for their use in the courtroom. A federal entity is needed to ensure that we don't have 50 states operating under 50 definitions of "science"; forensic science in America needs one standard of science so we can have one standard for justice. As Congress considers the establishment of such an agency, there are several principles that it should adhere to.

First, the National Institute of Forensic Sciences should focus on three critical priorities: (1) basic research, (2) assessment of validity and reliability, and (3) quality assurance, accreditation, and certification. This body should identify research needs, establish priorities, and precisely design criteria for identifying the validity and reliability of various extant and developing forensic assays and technologies. Then, using the data generated by research, this entity should then undertake a comprehensive assessment of the validity and reliability of each assay and technology to develop standards by which the practitioners must adhere and under which their reporting and court room testimony must operate. Given NIST's reputation as a highly respected and admired standard-setting agency, as well as its history of employing Nobel prize-winning scientists who conduct superb research and translate basic science to applied commercial standards and its tradition of objective, independent, science-grounded work, we agree with the NAS report that NIST would make a sensible partner for setting those standards. The Innocence Project also believes strongly that this body must play a central role in accreditation and certification. Laboratories that seek accreditation must have quality controls and quality assurance programs to ensure their forensic product is ready for the courtroom. Individual practitioners must meet certain training and education requirements, continuing education, proficiency testing, and parameters for data interpretation, report writing and testimony.

Second, to ensure this agency's objectivity and scientific integrity, and to prevent any real or perceived institutional biases or conflicts of interest, it is paramount that NIFS be a non-partisan, independent agency, with its basic and applied research products and standards grounded in the best traditions of the scientific method. We agree with the NAS report that "Governance must be strong enough—and independent enough—to identify the limitations of forensic science methodolo-

[20] *Ibid.,* p. 3–20.

gies and must be well connected with the Nation's scientific research base in order to affect meaningful advances in forensic science practices."[21]

Third, this entity will coordinate all existing and future federal functions, programs, and research related to the forensic sciences and forensic evidence.

Fourth, in order for this entity to be successful, forensic oversight must be obligatory and an effective mechanism of enforcement of these standards must exist. After having been given the proper direction and opportunity to comply, noncompliant laboratories or practitioners should lose their ability to participate in the business. These corrective actions can be overseen in conjunction with other government agencies; however enforcement powers must be under the command and control of the NIFS.

Fifth, this entity must be a permanent program in order to ensure ongoing evaluation and review of current and developing forensic science techniques, technologies, assays, and devices; and continued government leadership, both publicly and through private industry, in the research and development of improved technology with an eye toward future economic investments that benefit the public good and the administration of justice.

Finally, Congress must allocate adequate resources to the NIFS so that it can undertake its critical work quickly, effectively, and completely, and so its mandates can be executed in full.

Our work has shown the catastrophic consequences of such a lack of research, standards, and oversight. It is clear that the Nation's forensic science community is ready and willing to work with the Federal Government, law enforcement, and other scientists to ensure a brighter future for forensic science. Science-based forensic standards and oversight will increase the accuracy of criminal investigations, strengthen criminal prosecutions, protect the innocent and the victims, and enable law enforcement to consistently focus its resources not on innocent suspects, but on the true perpetrators of crimes. For as the Nation's post-conviction DNA exonerations have proven all too clearly, when the system is focused on an innocent suspect, defendant or convict, the real perpetrator remains free to commit other crimes.[22]

The investment of time, effort and resources necessary to deliver us from our false reliance on some forensic assays will pay tremendous dividends in terms of time, effort and resources not wasted by virtue of this false reliance. In short, it will make criminal investigations, prosecutions and convictions more accurate, and our public more safe—and perhaps most importantly, justice more assured.

We have been directed toward an irrefutable and unprecedented opportunity to significantly improve the administration of criminal justice in the United States. By evaluating and strengthening forensic science techniques with the strong, well-funded, and well-staffed entity we described, we can create a formal system to ensure that criminal justice is accurately conducted and justly performed. The research and development of both existing and new forensic disciplines will create new industries and jobs in the U.S., just as the development of DNA technologies and their applications has done. With your support, we will not only significantly enhance the quality of justice in the United States, but we will also minimize the possibility that tragedies like that endured by the Nation's 233 (and counting) exonerees and their families will needlessly be repeated time and again.

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[21] *Ibid.,* p. 2–19.

[22] In the wake DNA exonerations of the wrongfully convicted, that same DNA analysis has enabled us to identify 100 of the true suspects and/or perpetrators of those crimes.

INNOCENCE PROJECT

**Wrongful Convictions Involving Unvalidated or Improper Forensic Science that Were Later Overturned through DNA Testing**

The table below lists DNA exoneration cases (through February 1, 2009, the first 225 DNA exonerations in the nation) where unvalidated or improper forensic science contributed to the underlying wrongful conviction.

The Innocence Project defines unvalidated or improper forensic science as:

- the use of forensic disciplines or techniques that have not been tested to establish their validity and reliability;
- testimony about forensic evidence that presents inaccurate statistics, gives statements of probability or frequency (whether numerical or non-numerical) in the absence of valid empirical data, interprets non-probative evidence as inculpatory, or concludes/suggests that evidence is uniquely connected to the defendant without empirical data to support such testimony; or
- misconduct, either by fabricating inculpatory data or failing to disclose exculpatory data.

The determinations in this table make no conclusions about the state of mind of analysts involved in cases, which cannot typically be known. Many cases are included where the analyst's role is not at issue at all, but the forensic disciplines and techniques being used were not validated. Where the analysts' conduct is at issue, it may be attributed simply to innocent error, or it could be the result of negligence, recklessness or intent.

The determinations in this table are based on trial transcripts and other official sources. Many of these determinations are based on underlying research from Professor Brandon Garrett and Peter Neufeld for Invalid Forensic Science Testimony and Wrongful Convictions, 95 Va. L. Rev. 1 (2009). Garrett and Neufeld focused on one aspect of this category, invalid testimony by forensic analysts. In their research, Garrett and Neufeld consulted with a number of forensic scientists, attorneys and other experts in the field. The Innocence Project reviewed transcripts for cases that were included in Garrett and Neufeld's study, as well as transcripts in cases that were not included (because Garrett and Neufeld's scope was more limited).

This table includes specific quotes from trial transcripts and other official sources where available. In many cases, there may be additional bases for determining that unvalidated or improper forensic science was involved, but further research was not conducted once the case fit within the definition. Some cases may also not be included in this list at all because sufficient source material could not be located. Anyone with information about a DNA exoneration case involving unvalidated or improper forensic science that is not listed here should send that information to info@innocenceproject.org. Similarly, anyone

who believes that a case listed here does not fit the Innocence Project's definition of cases involving unvalidated or improper forensic science should send that information to the same email address. Since its inception, the Innocence Project has collected information about DNA exoneration cases – and has encouraged anyone with more information about these cases to share it for our review.

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Abdal, Wahir Abdal (Jenkins, Vincent) | NY | 15.0 | **Incorrect Hair Analysis.** An analyst testified that hairs from the crime scene were "distinctively different" from the defendant's but that he couldn't exclude the defendant based on the distinction because "it's not unusual to have different hairs come from the same person." The analyst went on to say that dad affects hair, giving a statistical probability that other unexamined hairs could be similar. "The study shows it would not be unusual to have a lock of 4,000 strands of hair from the head in order to get a match with any one particular hair. And, from the pubic hair, one may have to look at as much as 800 hairs, and it could be from the same person. That gives an idea of how much a hair can vary just within one single person." (Garrett/Neufeld, March 2009) |
| Adams, Kenneth | IL | 17.5 | **Incorrect Hair Analysis.** An analyst testified that the hair looked the same: "I couldn't distinguish if I was looking almost at two hairs. They looked just like one." The analyst said the hairs were "just like if you drop two dollar bills and you see dollar bills on the floor. You see two one dollar bills. It's obvious. And that's how it looked there." (Garrett/Neufeld, March 2009).<br><br>**Incorrect Serology.** An analyst also testified that Adams' blood exhibited an "H reaction" similar to the type A blood found in samples from the victim, and that less than 2% of the population has that type of clumping due to an "H reaction." (Garrett/Neufeld, March 2009). |
| Alejandro, Gilbert | TX | 3.5 | **Incorrect DNA Analysis.** A forensics expert claimed that there was a DNA match (based on banding that the analyst said "could only have originated from" the defendant), without providing a random match probability. In fact, DNA testing hadn't been done, or at least, only partial testing had been done. (Garrett/Neufeld, March 2009) |
| Atkins, Herman | CA | 11.5 | **Incorrect Serology.** An analyst testified properly that the sample could have come from the victim or could have been a combination of people. However, the analyst then said that the population of people who are A secretors and PGM type PGM 2+1+ is 8.1% of the white population and 4.4% of black people. (Garrett/Neufeld, March 2009) |
| Avery, Steven | WI | 17.5 | **Unvalidated Hair Analysis.** An analyst testified that after comparison, a hair sample from the crime scene and another taken from Avery were "similar" and "consistent." (Garrett/Neufeld, March 2009) |
| Barnes, Steven | NY | 19.5 | **Other Unvalidated Science.** An analyst testified that soil on Barnes' truck tires was similar to soil from the crime scene. An analyst also testified that a marking on the outside of Barnes' truck was similar to a unique pattern that is associated with one brand and style of blue jeans (the same brand and style of blue jeans the victim was wearing). (Trial transcript, page 587, 608, 687) |
| Bauer, Cherrie | MT | 6.3 | **Incorrect Serology.** The victim and the perpetrator were both O secretors, and an analyst limited the potential donor source to O secretors, ignoring the potential that the victim's blood groupings masked the perpetrator's. The analyst also said 7.5% of men could have been the source (improperly dividing the population statistic in half for males). (Garrett/Neufeld, March 2009)<br><br>**Incorrect Hair Analysis.** An analyst provided unsupported statistics in comparing the hairs. The analyst said that "to have them both match, it would be the multiplication of both factors so as an approximately using that 1 out of 100, you come out with a number like 1 chance in 10,000." (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Bibbins, Gene | LA | 15.5 | **Incorrect Fingerprint Analysis.** An analyst testified that lab analysis of fingerprints from the crime scene were inconclusive, and that the analyst had checked these findings with the state crime lab, which had reached the same conclusion. In fact, Bibbins was excluded as the source of the fingerprints, which was in a state crime lab report. (Garrett/Neufeld, March 2009) |
| Blair, Michael | TX | | **Incorrect Hair Analysis.** An analyst testified that the victim had unusual hairs: "The interesting thing about Ashley's hair, when you look at her standard, is that she has microovoid bodies. These are very small air inclusions that are smaller than a true ovoid body. Ovoid bodies are mostly found in cattle hair and they're much larger, but Ashley, throughout her standard or known head hairs, has these microstructures." He linked the characteristics of the hair to the commission of an assault, claiming he observed evidence that "the hair has been crushed or partially flattened or frayed ends. The other end of this hair has a similar appearance indicating that this hair piece has been subjected to some sort of blunt force." The analyst also testified that evidence found at the crime scene included hairs he identified as Michael Blair's. The analyst explained "I've never seen a Caucasian or Mongoloid hair that was opaque like that." The analyst then added, "I haven't seen a hair like that before. Not a human hair." The analyst also identified a fiber in Blair's car as being from the victim's toy, stating that "This is a fiber seldom encountered in forensic work." (Garre |
| Boquete, Orlando | FL | 12.0 | **Incorrect Serology.** An analyst testified that both the victim and Boquete were both O non-secretors. However, two spots on the victim's panties had Type A substances, while two other spots had no blood group substances. The analyst did not exclude Boquete based on the A substances. Regarding the spots that had no blood group substances, the analyst said they could have come from Boquete because he was a non-secretor, adding that 20% of the population are non-secretors. In fact, those two spots with no blood group substances could have come from the victim. (Garrett/Neufeld, March 2009) |
| Brown, Mark Diaz | CA | 3.0 | **Incorrect Serology.** An analyst testified that 3% of the population is PGM 2-1+, but then erroneously divided that statistic in half (supposedly eliminating females) to claim that 1.5% of men could be the source. (Garrett/Neufeld, March 2009) |
| Brewer, Kennedy | MS | 7.0 | **Unvalidated Bite Mark Analysis.** A forensic odontologist testified that there was "reasonable medical certainty" that Brewer's top two teeth caused bite marks found on the victim. When explaining what "medical certainty" means, analyst testified, "yes, he did" leave the marks. (Garrett/Neufeld, March 2009) |
| Brisco, Johnny | MO | 22.0 | **Unvalidated Hair Analysis.** An analyst testified that pubic hairs from the crime and Brisco's pubic hairs exhibited "similar microscopic characteristics." (Trial transcript, page 198) |
| Brison, Dale | PA | 3.5 | **Unvalidated Hair Analysis.** An analyst testified that hairs from the crime were "consistent" and "similar" to Brison's hair. (Trial transcript, page 144) |
| Bromgard, Jimmy Ray | MT | 14.5 | **Incorrect Hair Analysis.** An analyst testified to fabricated hair match statistics. He testified that hair from the crime scene "matches all the characteristics" of Bromgard's pubic hair "and they almost look like one hair." He testified that there is a one in 100 chance of a head hair matching an individual, and a one in 150 chance of a pubic hair matching an individual – and that "It's a multiplying effect," so there was a one in 10,000 chance that the hairs belonged to anyone else. "[I]t's the same as two dice," he testified. "If you throw one dice with a one, one chance out of six; if you throw another dice with a one, it's a one chance out of six, you multiply the odds together." (Garrett/Neufeld, March 2009) |
| Brown, Dennis | LA | 19.0 | **Incorrect Serology.** Both the victim and Brown were O secretors, and the stains were also Type O. An analyst testified that the source of stains found on the crime scene would have to be from a Type O secretor or non-secretor, and said that 46.5% of the population could have been the donor. However, no person should have been excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| Brown, Ray | NY | 19.0 | **Unvalidated Bite Mark Analysis.** A forensic odontologist testified that at least four bite marks on the victim's body were "entirely consistent" with Brown. The analyst also noted an "apparent inconsistency," but rather than exclude Brown, he called it an "explainable consistency" because the mark was on a curved thigh. In fact, the bite marks showed four incisor teeth, while Brown only had two. (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Bryson, David Johns | OK | 16.0 | **Unvalidated Hair Analysis.** An analyst said hairs from the crime scene matched Bryson. The analyst said hair has "unique characteristics" that make it possible to determine a match. (Bryson v. Gonzales decision, U.S. Court of Appeals for the 10th Circuit, July 28, 2008) |
| Buntin, Harold | IN | 13.0 | **Incorrect Serology.** An analyst testified that the victim and Buntin were both Type O, as was the fluid recovered from the victim. The analyst testified that 56% of the population is Type O. No person should have been excluded because the victim's blood group markers could have marked the perpetrator's. (Statement of Facts in the Trial Record) |
| Byrd, Kevin | TX | 12.0 | **Incorrect Serology.** Byrd is a non-secretor. No antigens were detected on a stain at the crime scene, so the analyst assumed that the victim was also a non-secretor, as well. The analyst testified that 15-20% of the population are non-secretors. In fact, no donor could be eliminated because no determination had been made about the victim's secretor status (so it's impossible to know whether her blood group markers marked the perpetrator's) and because the sample could have lacked antigens due to degradation. (Garrett/Neufeld, March 2009) |
| Charles, Clyde | LA | 17.0 | **Unvalidated Hair Analysis.** An analyst testified that hairs from the crime were "similar" to Charles'. (The analyst also testified that hair analysis is not "an exact science" and that it's possible to "find people whose hair is the same.") (Trial transcript, page 307) |
| Charles, Ulysses Rodriguez | MA | 17.0 | **Improperly/Negligence/Misconduct.** Charles was a B secretor and the victims were O secretors; stains from the crime contained antigens consistent with the victims' O type. Two experts testified that rudimentary testing for the presence of sperm found none; since Charles was a B secretor the absence of sperm was highly relevant (it explained why no B substances were detected). When a private forensic lab tested the evidence years later, analysts detected sperm using a microscope, the same technology analysts used before Charles' trial. (Garrett/Neufeld, March 2009) |
| Collins, Ronald | NC | 10.8 | **Other Unvalidated Science.** An analyst testified that material from Collins's tennis shoes was consistent with rubber found at one of the crime scenes. (Kinston County Superior Court Order, November 5, 1984; Judge D.M. McLelland) |
| Cowans, Stephan | MA | 5.5 | **Incorrect Fingerprint Analysis.** An analyst testified that fingerprints at the crime scene matched Cowans. However, Cowans' fingerprints were actually compared to themselves and not to the fingerprint on the evidence. (Garrett/Neufeld, March 2009) |
| Criner, Roy | TX | 10.0 | **Incorrect Serology.** Criner was an O secretor, and the victim's blood group marking was not determined. An analyst testified that 44% of the population are O secretors and could have been the donor. H blood group substances were detected, which could have come from the victim if she were a secretor, so nobody could be excluded as the donor. (Garrett/Neufeld, March 2009) |
| Cretzar, Alan | FL | 24.5 | **Unvalidated Hair Analysis.** An analyst testified that hairs from the crime scene exhibited "the same microscopic characteristics" as Cretzar's hair. (Trial transcript, page 44)<br><br>**Incorrect Serology.** The victim and Cretzar were both O secretors, PGM1, as were the swabs. An analyst testified that she could "only say it was either from a non-secretor or person of ABO Type O secretor PGM Type 1," which is made up of "36.4% of the total population." She then divided the 36.4% in half to testify that "approximately 18%" of males could have been the source. Dividing the statistic in half was erroneous, but moreover the analyst could not exclude anyone as the potential source, since the victim's blood group markers could have marked the perpetrator's. (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Dillon, William | FL | 26.0 | **Other Unvalidated Science.** The state introduced testimony from a dog handler that connected Dillon to the crime scene. Authorities hired John Preston, a purported expert in handling scent-tracking dogs. Eight days after the crime, Preston and his dog, Hassas II, conducted two tests which he said linked the T-shirt to the crime scene and Dillon to the T-shirt. In the second test, a "paper lineup" which allegedly linked Dillon to the T-shirt, Preston allowed his dog to sniff the T-shirt and then pieces of paper, including one Dillon had touched. Preston said the dog selected Dillon's paper. (Motion for Postconviction Relief to Vacate Judgment and Sentence, August 25, 2008) |
| Domínguez, Alejandro | IL | 4.0 | **Incorrect Serology.** The victim was a B secretor and Domínguez was an O secretor. Two of the tested stains had B and H antigens, which were consistent with the victim. However, the analyst testified that Domínguez could not be excluded and that O secretors comprise 38% of the population. In fact, nobody in the population could be excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| Dotson, Gary | IL | 18.0 | **Unvalidated Hair Analysis.** An analyst testified that a pubic hair removed from complainant's underwear was "similar" to that of defendant but "dissimilar to that of complainant." (Appellate Court of Illinois Ruling, November 12, 1997)<br><br>**Incorrect Serology.** The victim and Dotson were both B secretors. B substances were found on the victim's underwear, and the analyst testified that the donor was a B secretor. Those substances could have been entirely from the victim, so any male could have been the donor. Another stain had A antigens that were foreign to both Dotson and the victim, but the analyst failed to exclude Dotson as the source -- telling the court it could be a mixture of blood and sweat, wood, leather, detergents or other substances. (Garrett/Neufeld, March 2009) |
| Durham, Timothy | OK | 3.5 | **Incorrect Hair Analysis.** An analyst testified that hair from the crime and Durham's hair shared supposedly rare characteristics: the hair curled, something that the analyst said he had never seen in Caucasoid hair. The analyst also assigned a percentage to a reddish hue observed on the sample, testifying, "I have seen it in less than 5% of the hairs that I examined. These particular hairs were especially light. I have not found any pubic hairs as light as these before." (Garrett/Neufeld, March 2009) |
| Erby, Lonnie | MO | 17.0 | **Incorrect Serology.** The victim and Erby were both O secretors, but the analyst testified that the perpetrator had to be an O secretor or a non-secretor. In fact, no donor could be excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| Fain, Charles Irvin | ID | 17.5 | **Incorrect Hair Analysis.** An analyst testified that Fain's hair and hairs from the crime shared unique characteristics. The analyst said the hairs had bifurcated medulla, which the analyst said gave "the sample uniqueness," explaining that "It's not often seen in hair samples ... it's not a characteristic that is very common, so that's -- that's the reason why I remember this particular characteristic." (The analyst also noted that hair comparison is subjective.) (Garrett/Neufeld, March 2009)<br><br>**Other Unvalidated Science.** An analyst connected footprints found at the crime scene to shoes belonging to Fain, saying, "I found, therefore, that the shoe which made this impression, and this left shoe had sustained wear in the same area. To a -- a shoe print examiner, this would indicate that the individual who walked with these shoes has the same walking gait." (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Fritz, Dennis | OK | 11.0 | **Incorrect Serology.** An analyst did not detect blood group substances in fluids from the crime. The analyst testified that this meant the perpetrator was a non-secretor. In fact, if the victim was a non-secretor nobody could be excluded because her blood group markers could mask the perpetrator's, or the lack of blood group substances could have been the result of degradation. (Garrett/Neufeld, March 2009)<br><br>**Incorrect Hair Analysis.** An analyst testified that 11 public hairs and two head hairs from the crime were "consistent" with Fritz's hairs. The analyst told the court that "generally three main results can be considered, but there's actually five or more ways of reporting hair examinations. One is that hairs are consistent microscopically and could have the same source. This means that they match if you said it in one word." The analyst went on to testify that there was an increased significance to finding that both pubic hairs and head hairs matched. (Garrett/Neufeld, March 2009) |
| Fuller, Larry | TX | 19.5 | **Incorrect Serology.** The victim was an O non-secretor and Fuller was an AB non-secretor; the rape kit sample was O. The analyst testified that the source could have been a non-secretor, and that Fuller and 28% of the population were possible donors. In fact, both Fuller and the victim should have been excluded since neither of them secretes blood groups. (Garrett/Neufeld, March 2009) |
| Good, Donald Wayne | TX | 13.5 | **Incorrect Serology.** Good was an O secretor; a stain on a blanket was Type O, while a swab was A and H blood groups. About the swab, the analyst testified that it was impossible to put a percentage on the potential donor population because the fluid could be a mixture of vaginal secretions and seminal fluids. While the analyst was correct about the potential for masking, the percentage for the possible donor population would be 100%. About the blanket, which could have also been a mixture, the analyst said blood could have been the source, along with "one-third of the Caucasian male population." (Garrett/Neufeld, March 2009) |
| Grey, Paula | IL | 8.0 | **Incorrect Serology.** An analyst testified that the tested sample "contained Group A blood and also had distinct characteristic of showing up slight agglutination in the O well, which would indicate person had H substance found in his blood." (Garrett/Neufeld, March 2009) |
| Green, Anthony Michael | OH | 13.0 | **Incorrect Hair Analysis.** An analyst testified that the hair characteristics "eliminated a large percentage of the population." (Garrett/Neufeld, March 2009)<br><br>**Incorrect Serology.** The victim and Green were both B secretors, and the stain showed both B and H antigens. The analyst testified that B secretors were 16% of the population; the analyst conclusively ruled out 84% of the population as the source. The testimony failed to account for the possibility that the victim's blood group markers could mask the perpetrator's. (Garrett/Neufeld, March 2009) |
| Gregory, William | KY | 7.0 | **Incorrect Hair Analysis.** An analyst testified that hairs from the crime scene "more than likely" came from Gregory. She said the hairs had unique characteristics, including ovoid bodies, and said, "I told you, there is no statistics on this. I can tell you this is the first time I have ever had a Negroid origin hair that has not had a medulla in it." When asked what percentage of people have ovoid bodies in their, analyst testified, "This is probably the first time I have ever seen an ovoid body in a human hair. I have seen them in cattle hair before." Testifying about how common similarities in hair are, the analyst said that siblings might share "very similar characteristics" in their hair but that "in general, you wouldn't see that kind of an overlap in two people you would just pick up off the street." The analyst failed to testify that she had determined that at least one additional hair was not consistent with Gregory's. (Garrett/Neufeld, March 2009) |
| Halstead, Dennis | NY | 16.0 | **Unvalidated Hair Analysis.** An analyst testified that hairs found in a co-defendant's car were "microscopically alike" to samples from the victim. ("The analyst acknowledged that he could not say the hairs were "identical" and that he "visit[ed]" hair analysis was "a bit more exact.") (Trial transcript, page 1,213) |
| Harris, William | WV | 7.0 | **Incorrect Serology.** An analyst testified that the victim could not be the source of the material tested, even though both the victim and Harris were O secretors, PGM1+, as were the tested. Rather than saying that 100% of the population could be the source (because the victim's blood group markers could have masked the perpetrator's), the analyst said that 11.6% of the population could have been the source, then erroneously divided that statistic in half for the male population. (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Harrison, Clarence | GA | 17.5 | **Incorrect Serology.** Harrison is an O secretor and the victim was an A secretor; the semen had A and O antigens. The analyst concluded that the only group that could be excluded were B secretors and AB secretors, which would eliminate 22% of the population, and that Harrison was not within that 22%. In fact, nobody could be excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| Hatchett, Nathaniel | MI | 10.3 | **Unvalidated Hair Analysis.** An analyst testified that a pubic hair found on the passenger-side floor of the victim's car was "similar" to Hatchett's hair sample. (Michigan Court of Appeals Ruling, May 19, 2000) |
| Helms, Chad | FL | | **Incorrect DNA Analysis.** An analyst gave faulty testimony by failing to provide relevant statistics for the population included by DQ Alpha type DNA testing. (Garrett/Neufeld, March 2009) |
| Hicks, Anthony | WI | 8.0 | **Unvalidated Hair Analysis.** An analyst testified that tested hairs were "consistent" and "similar" with Hicks. (The analyst also said microscopic hair analysis cannot specifically match individuals, like fingerprints.) (Trial transcript, page 454) |
| Holland, Dana | IL | 8.0 | **Incorrect DNA Analysis.** An analyst testified that the evidence sample taken from the crime scene was too small for DNA testing. An independent DNA expert explicitly refutes the analyst's claim, saying that at the time of the trial, with technology available at the time, DNA testing could have been conducted. (Report from Orchid Cellmark analyst Kristen Koch, September 23, 2002) |
| Honaker, Edward | VA | 8.5 | **Incorrect Hair Analysis.** An analyst testified that the tested hair was "consistent" with Honaker and concluded that it came from Honaker or someone of the same race, coloring and microscopic makeup: "It is unlikely that the hair would match anyone other than the defendant, but it is possible." (Garrett/Neufeld, March 2009) |
| Jackson, Willie | LA | 17.0 | **Unvalidated Bite Mark Analysis.** An analyst testified, "My conclusion is that Mr. Jackson is the person who bit this lady." (Garrett/Neufeld, March 2009) |
| Jimerson, Verneal | IL | 10.5 | **Incorrect Serology.** The victim and Jimerson were both Type O, and the stain had A and O antigens -- yet the analyst failed to exclude Jimerson. (Garrett/Neufeld, March 2009) |
| Johnson, Calvin | GA | 15.5 | **Incorrect Serology.** The victim was an A secretor and Johnson was an O secretor; the semen had A and H. The analyst testified that the potential donor group was the 44% of the population who are O secretors, plus 20% who are non-secretors, plus A secretors (for which the analyst did not give a statistic), leaving out the B and AB secretors. In fact, 100% of the population could have been the donor because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| **Jones, Ronald** | IL | 13.0 | **Incorrect Serology.** Jones was an O non-secretor and the victim was an A secretor; the swabs had A antigens. The analyst testified that the percentage of the population who could be the donor was the number of non-secretors added to A secretors. In fact, no donor could be excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| **Kogut, John** | NY | 17.0 | **Incorrect Hair Analysis.** The analyst testified, "I'm saying that in this particular instance that the questioned hair could have originated from the scalp of Theresa Fusco, with a high degree of probability." (Garrett/Neufeld, March 2009) |
| **Kordonowy, Paul** | MT | U | **Incorrect Serology.** Kordonowy and the victim were both O secretors, but A secretions were found on the swabs. The analyst should have excluded Kordonowy but instead testified that sugars produced by bacteria could have caused the A substance reading. (Garrett/Neufeld, March 2009)<br><br>**Incorrect Hair Analysis.** An analyst testified that hairs from the crime "match" Kordonowy, and that for each there is a 1 in 100 probability of a match, claiming that hairs from different parts of the body are "independent events." The analyst multiplied that figure to arrive at a 1 in 10,000 probability of a match. (Garrett/Neufeld, March 2009) |
| **Krone, Ray** | AZ | 12.0 | **Unvalidated Bite Mark Analysis.** An analyst testified that he was "certain" that Krone's teeth caused bites on the victim, and that it was "a very good match." He went on to say that bite mark comparison "has all the veracity, all the strength that a fingerprint would have." The prosecution also failed to disclose that an FBI expert had examined the bite marks and said they weren't from Krone. (Garrett/Neufeld, March 2009) |
| **Laughman, Barry** | PA | 19.0 | **Incorrect Serology.** The victim was an A secretor and Laughman was a B secretor. No B substances were detected in the evidence, but the analyst said bacteria could have "worked on these antigens" or they could have broken down. The analyst also testified that medications could have interfered with the antigens. The analyst then claimed that bacteria could actually convert one blood group substance to another: "Given sufficient time for those bacteria to act, it would be possible to convert a group A substance to a B, or a B substance to an A." (Garrett/Neufeld, March 2009) |
| **Lavernia, Carlos** | TX | 15.0 | **Incorrect Serology.** The victim was an O secretor and Lavernia was an O non-secretor. The analyst said, "The semen donor was either a blood group O secretor or a non-secretor" and that "O secretor is found in 33% of the population, so that's a third of the people, of males." The analyst did not say that 100% of the population could be the donor because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| **Linscott, Steven** | IL | 3.8 | **Unvalidated Hair Analysis.** An analyst testified that hairs from the crime were "consistent" with Linscott's and "similar" to Linscott's. (Trial transcript, pages 131 and 137) |
| **Lowery, Eddie** | KS | 9.5 | **Incorrect Serology.** An analyst found Type A substances in the sample but claimed that the semen originated from an O secretor. The analyst determined that Lowery was an O secretor, and the victim was determined to be an A secretor. From an expert independent forensic expert's report on the case: "It is unclear how the analyst determined that the semen from the victim's vaginal swabs originated from O secretor when she found A blood group substance in this sample." (Forensic Science Associates report, 2002) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| **Ochoa, James** | CA | 1.0 | **Other Unvalidated Science.** A police bloodhound linked Ochoa to the crime. The dog had followed a scent for an hour from the perpetrator's bed to Ochoa's front door. (Los Angeles Times, April 24, 2008) |
| **O'Donnell, James** | NY | 2.0 | **Unvalidated Bite Mark Analysis.** An analyst testified that O'Donnell's teeth were "correlated" with bite marks found on the victim. (Trial transcript, page 377) |
| **Collins, Calvin** | IL | 13.5 | **Incorrect Serology.** An analyst never explained a lab report's finding of a PGM type foreign to the victim. Instead, the analyst testified that 37% of the population shared Collins' type, never saying that Collins was not a secretor and could not have been the donor. Further, the type that the analyst attributed to Collins could have come from the victim. In a report on the case years later, an expert DNA analyst said the analyst at trial "failed to state that her findings eliminated Larry and Calvin Collins, Sa[illegible]nders and Bradford unless there was another semen source who was an ABO Type O secretor." (Dr. Edward Blake, Review of the Testimony of Pamela Fish, January 8, 2001. Garrett/Neufeld, March 2009) |
| **Collins, Larry** | IL | 13.5 | **Incorrect Serology.** See Calvin Collins, (above). |
| **Pendleton, Marlon** | IL | U | **Incorrect DNA Analysis.** An analyst testified that the DNA sample taken from the crime scene was too small for testing at the time of trial, but analysis by a forensic expert chosen by the defense and prosecution to handle post-conviction DNA testing said the sample was large enough to test at the time of the trial, using the technology then available. (Center on Wrongful Convictions. Brian Wessell, chief forensic serologist at Serological Research Institute as quoted in Chicago Tribune November 23, 2008, and November 24, 2008) |
| **Peterson, Larry** | NJ | 16.5 | **Incorrect Hair Analysis.** At trial, the prosecutor asked the analyst whether s/he was saying that "every hair that was known as a questioned hair has been identified as either belonging to the victim or as belonging to Mr. Peterson?" The analyst responded, "Yes." (Garrett/Neufeld, March 2009)<br><br>**Impropriety/Negligence/Misconduct.** No serology was conducted because the analyst detected no semen in the rape kit. Later testing readily observed sperm in the rape kit and elsewhere. (Garrett/Neufeld, March 2009) |
| **Pierce, Jeffrey** | OK | 14.5 | **Incorrect Hair Analysis.** An analyst testified that hair had a unique "banding effect" which the analyst interpreted to mean that part of the perpetrator's hair was exposed to the sun and part wasn't (since some was blonde and some was brunette), which supported the prosecution theory because Pierce regularly wore a bandana. (Garrett/Neufeld, March 2009)<br><br>**Incorrect Serology.** Pierce was an A0 secretor and the victim was an O secretor. H substances were detected in the sample. The analyst testified that the semen donor was a Type O or a non-secretor, which failed to recognize the potential that the victim's blood group markers masked the perpetrator's. (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| **Pope, David Steven** | TX | 15.0 | **Other Unvalidated Science.** When testifying about a voice on an answering machine and Pope's voice, an analyst was asked, "The bottom line analysis on the known voice and the unknown voice in this situation were only made by one single person in the whole wide world?" and the analyst replied, "Exactly." The analyst was then asked, "Just like fingerprints, it is unique?" and the analyst said, "Exactly." (Garrett/Neufeld, March 2009) |
| **Reinge, Willie** | IL | 17.5 | **Incorrect Serology and Hair Analysis.** See Kenneth Adams (above). Adams, Reinge and Dennis Williams were tried together and the hair and serology testimony linked all three to the crime. |
| **Restivo, John** | NY | 18.0 | **Unvalidated Hair Analysis.** See Dennis Halstead, above. Restivo and Halstead were tried together and the hair testimony linked both to the crime. |
| **Reynolds, Donald** | IL | 9.5 | **Incorrect Serology.** The victim was an A secretor and Reynolds was an O secretor. An analyst testified that swabs from the crime showed both A and H activity, which the analyst said is indicative of Type A and O individuals. The analyst testified that Reynolds could not be excluded (while also saying 43% of the population has that type). The substances were entirely consistent with the victim, and the analyst ignored the potential that the victim's blood group markers masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| **Richardson, James** | WV | 9.0 | **Incorrect Serology.** Substances detected on the evidence were consistent with the victim, but the analyst ignored the potential that the victim's blood group markers masked the defendant's. The analyst also improperly divided the statistic for the population of possible donors in half to eliminate females. (Garrett/Neufeld, March 2009) |
| **Richardson, Kevin** | NY | 5.5 | **Incorrect Hair Analysis.** An analyst compared hairs found at the crime scene to Richardson's hair, asked whether it was possible that the hairs came not from Richardson but from another, unknown person, the analyst said it was possible "in a sense" but unlikely. The analyst testified that, based on experience examining hair standards, finding similarities between hairs has greater probative value: "I've looked at thousands of hair standards over the course of my work and I haven't seen any that have the same range of physical characteristics yet … But I have in fact looked at thousands of standards and haven't seen two that matched exactly." (Garrett/Neufeld, March 2009) |
| **Robinson, Anthony** | TX | 19.0 | **Incorrect Serology.** Both the victim and Robinson were A secretors. An analyst testified that "the sub type found in the semen was the same as the sub type found in the blood of the victim and the suspect" and said that 40% of the population is Type A. In fact, 100% of the population could have been the donor, since the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| **Rodriguez, George** | TX | 17.0 | **Incorrect Serology.** Both the victim and Rodriguez were O non-secretors, while another suspect was an O secretor. The stains were Type A. The analyst testified that Rodriguez could not be excluded but the other suspect could "because he is a secretor and the grouping would be O," adding that "none of those O secretions did show up by the testing." The A substances on the stain were foreign to the victim and to Rodriguez, so he should have been excluded. Later analysis by an independent lab found that the other suspect was actually an O non-secretor. (Garrett/Neufeld, March 2009) |
| **Rollins, Lafonza** | IL | 18.0 | **Impropriety/Negligence/Misconduct.** Serological testing excluded Rollins, but the stipulation about the testing reported only that sperm had been detected. The analyst requested DNA testing, but forensic supervisors refused to allow DNA testing to be conducted. (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| Rose, Peter | CA | 8.0 | **Incorrect Serology**. The victim was an O secretor PGM1+, and Rose was an A secretor PGM1+; the stain was PGM1+, ABO type inconclusive. The analyst testified that Rose could not be excluded and said that "about 38% of the population" possesses PGM1+, failing to state that 100% of the population could have been the donor because the PGM1+ could have come entirely from the victim. (Garrett/Neufeld, March 2009) |
| Salaam, Yusef | NY | 5.5 | **Unvalidated Hair Analysis.** See Antron McCray (above). |
| Santana, Raymond | NY | 5.0 | **Unvalidated Hair Analysis.** See Antron McCray (above). |
| Saunders, Omar | IL | 13.5 | **Incorrect Serology**. See Calvin Ollins (above). |
| Scott, Calvin Lee | OK | 20.0 | **Incorrect Hair Analysis.** In testimony, an analyst was asked whether there have been studies conducted about the probabilities of hair similarity. The analyst cited one study but noted the lack of research. About the one study, the analyst was asked: "Would he have given, or would there be any number type odds to the probability of the hair found on [the victim's] bottom sheet and the unknown hair found in her pubic combings, both belonging to anyone other than the defendant?" The analyst responded: "His hair, I would say this: his studies were made on Caucasian hair, I believe. In this case having two hairs identified, two hairs of different kind, I mean, head hair from one person would be quite large, I would say, I would not give a figure. It would be quite large." (Garrett/Neufeld, March 2009) |
| Sutton, Josiah | TX | 4.5 | **Incorrect DNA Analysis.** An analyst testified that "no other two persons will have the same DNA except in the case of -- identical twins" without giving a random match probability. Also, evidentiary samples were mixed and findings on one test in combination with a second actually excluded Sutton as a contributor. (Garrett/Neufeld, March 2009) |
| Taylor, Ronald Gene | TX | 12.0 | **Impropriety/Negligence/Misconduct.** In initial tests, the analyst failed to detect semen on a bed sheet from the crime, so no testing could be done to include or exclude Taylor as a possible donor. Those tests for the presence of semen were either not conducted or conducted incorrectly, because DNA testing that exonerated Taylor was done on the same spot on the sheet the analyst claimed to test for the presence of semen. Prior to conducting DNA testing on the spot, the private forensics lab conducted acid phosphatase testing (to determine the presence of semen -- the same kind of testing the lab analyst claimed to conduct pretrial) and the testing showed a positive result for the presence of semen. Subsequent DNA testing on that spot exonerated Taylor. (Trial transcript, page 266; Post Conviction Writ, Presiding Judge Denise Collins, October 9, 2007; Memorandum of Law in Support of Application for a Writ of Habeas Corpus, page 3, page 14, October 2007) |
| Tillman, James C. | CT | 16.5 | **Incorrect Serology**. An analyst testified that it was impossible that a stain or part of a stain could be from a secretor and not include the relevant antigens. The testimony ignored the possibility that a finding of no antigens could be the result of degradation. Later, DNA testing on the stain on the dress matched a stain on the pantyhose, highlighting how the failure to see antigens on the pantyhose stain was the result of the quality or quantity of the stain on the pantyhose. (Garrett/Neufeld, March 2009) |
| Vasquez, David | VA | 4.0 | **Unvalidated Hair Analysis.** An analyst testified that hair from the crime was "consistent" with hair samples taken from Vasquez. ("Convicted by Juries, Exonerated by Science," U.S. Department of Justice, National Institute of Justice, June 1996, page 72) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| **Velasquez, Eduardo** | MA | 12.5 | **Unvalidated Hair Analysis.** The analyst testified that two pubic hairs come from the victim's slip and one that was with some of the victim's hairs that also contained the perpetrator's semen) were "within the [same] range" as the defendant's and "consistent" with the defendant's hair. (The analyst also testified that hair analysis cannot "be taken as positive identity.") (Trial transcript, page 125, 131) |
| **Waller, James** | TX | 18.0 | **Incorrect Hair Analysis.** An analyst testified that hairs from the crime did not match Waller's hair, but also said it's impossible to make an exclusion: "If you wanted to say that this hair did not come from this individual, you would have to check it against every hair to be positive that it did not come from that individual ... [one would] practically have to denude a person to make a proper comparison." (Garrett/Neufeld, March 2009) |
| **Wardell, Billy** | IL | 9.5 | **Incorrect Serology.** The victim was an A secretor. Wardell was a B secretor, and his co-defendant (Reynolds, above) was an O secretor. The analyst testified that A and H activity was detected in the sample, "which is indicative of a Type A individual and a Type O individual." The analyst agreed that more than 40% of the population have those types, but the analyst failed to state that the findings were entirely consistent with the victim and that the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| **Washington, Calvin** | TX | 13.0 | **Unvalidated Bite Mark Analysis.** An analyst testified that a bite mark found on the victim was "consistent" with Washington's co-defendant. While the analyst excluded Washington as the source of the bite mark, his bite mark testimony about the co-defendant (which was given at Washington's trial) tied Washington to the crime. (Trial transcript, page 1,278) |
| **Washington, Earl** | VA | 17.0 | **Improperly/Negligence/Misconduct.** An analyst detected TTCO (an unusual plasma protein) during serology testing on crime scene evidence. Once Washington, who does not possess TTCO, became a suspect, an amended forensic report was prepared (without additional testing being conducted) that said the TTyping on the crime scene evidence was "inconclusive." (Garrett/Neufeld, March 2009) |
| **Watkins, Jerry** | IN | 13.5 | **Incorrect Serology.** The victim was an A secretor. Watkins was an O secretor, and the tests from the victim showed A and B substances. Rather than exclude Watkins, however, the analyst speculated that bacteria may have caused the inconsistent finding: "You are dealing with a dead body in which you have decomposition and sometimes bacteria will acquire a B blood group substance activity which could possibly be causing it." (Garrett/Neufeld, March 2009) |
| **Webb, Thomas** | OK | 13.0 | **Unvalidated Hair Analysis.** An analyst testified that two scalp hairs and a pubic hair recovered from the victim's home were "consistent" with samples taken from Webb. (Oklahoma Court of Criminal Appeals decision, November 20, 1987) |
| **Webb, Troy** | VA | 7.5 | **Incorrect Serology.** Webb was a non-secretor and tests from the victim were an A Type that could not have come from the victim. Webb should have been excluded, but the analyst instead testified that he was among the 20% of the population who are non-secretors. The analyst testified: "It's a possibility because it dated you have to have two or more seminal fluids present in that mixture. If that is indeed true, then yes. There's one possibility a non-secretor can be present. Definitely an A secretor is present because we found A which is foreign to the victim." (Garrett/Neufeld, March 2009) |
| **Webster, Bernard** | MD | 28.0 | **Incorrect Serology.** The victim was Type B (secretor status unknown) and Webster was A. The tested stain had A and B substances, so the perpetrator could have been an A or AB secretor. However, an analyst testified that the perpetrator "should have been a Type A." (Garrett/Neufeld, March 2009) |

| Name of Defendant | State | Years Served | Details/Notes |
|---|---|---|---|
| White, John Jerome | GA | U | **Incorrect Hair Analysis.** An analyst testified that hair from the crime and White's hair "shows sufficient similarity to say or conclude that the hairs were of the same origin." (Garrett/Neufeld, March 2009) |
| Whitley, Drew | PA | 18.6 | **Incorrect Hair Analysis.** An analyst acknowledged that the hairs were unsuitable for comparison, but went on to compare them and deem them consistent. "Because they were so small, they had very little in characteristics. Except for the two that had no roots, all of them had no tips on them, so they had very limited characteristics, what characteristics were there ... In examining these questioned hairs and the facial hairs of Drew Whitley, I concluded there were many, many overlapping characteristics and similarities." The analyst also said: "I found no inconsistencies. Based on what I am basing my comparing on, yes, they are consistent." And later said: "I wouldn't go that far to say they were microscopically consistent." (Garrett/Neufeld, March 2009) |
| Williams, Dennis | IL | 17.5 | **Incorrect Serology and Hair Analysis.** See Kenneth Adams (above). Adams, William Rainge and Williams were tried together and the hair and serology testimony linked all three to the crime. In addition, an analyst testified that Williams was an A secretor; in fact, he was an A non-secretor. (Garrett/Neufeld, March 2009) |
| Williams, Willie "Pete" | GA | 21.5 | **Incorrect Serology.** The victim was an O secretor and O group substances were found; Williams was a non-secretor. The analyst testified that 44% of the population could be excluded and that O secretors and all non-secretors (but not A or B secretors) could be the donor. In fact, more could be excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |
| Williamson, Rob | OK | 11.0 | **Incorrect Serology.** The victim was Type A (and was not tested for secretor status) and Williamson was an O non-secretor. There was no antigen activity in the stains, but rather than attribute this to degradation, the analyst testified this meant the perpetrator could be a non-secretor. (Garrett/Neufeld, March 2009)<br><br>**Unvalidated Hair Analysis.** An analyst testified that pubic hair and scalp hair from the crime scene were "consistent microscopically" with Williamson's. (The analyst also testified that "hairs are not absolute identification.") (Trial transcript, page 733, 788) |
| Willis, John | IL | 7.8 | **Impropriety/Negligence/Misconduct.** An analyst testified that serology testing was inconclusive when it in fact excluded Willis. (Center on Wrongful Convictions; Chicago Tribune, October 26, 2004, based on lab notes and records the newspaper filed a lawsuit to obtain) |
| Wise, Khiamp | NY | 11.5 | **Incorrect Hair Analysis.** See Kevin Richardson, above. (Richardson and Wise were tried together; the analyst's testimony about Richardson's hair also linked Wise to the crime.) |
| Woodall, Glen | WV | 4.8 | **Incorrect Serology.** Woodall was a B secretor, GLO I Type 2-1and both victims were also GLO I Type 2-1. The perpetrator could have had one of several GLO types, but the analyst testified that just 6 out of 10,000 people have the same blood groupings as Woodall, "based specifically just on the male population of Calhoun County." (Garrett/Neufeld, March 2009)<br><br>**Incorrect Hair Analysis.** Comparing hairs from the crime to Woodall's hair, an analyst testified that "it would be very highly unlikely that due to no dissimilarities identifiable and distinguishable, that the hair could have originated from anyone else." (Garrett/Neufeld, March 2009) |
| Woods, Anthony D. | MO | 18.0 | **Incorrect Serology.** The victim was an A secretor and the stains all had A blood group substances. However, the analyst excluded AB and B people, which is 11% of the black population. In fact, nobody could be excluded because the victim's blood group markers could have masked the perpetrator's. (Garrett/Neufeld, March 2009) |

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BIOGRAPHY FOR PETER J. NEUFELD

Peter Neufeld co-founded and co-directs The Innocence Project, an independent non-profit affiliated with the Benjamin N. Cardozo School of Law. He is also a partner in the civil rights law firm Cochran Neufeld & Scheck, LLP.

The Innocence Project began in 1992 as a clinical program with the single focus of exonerating the wrongfully convicted. In April, 2007, the Project celebrated the 200th post conviction DNA exoneration. The work has expanded to bring substantive reform to the system responsible for unjust imprisonment, with particular attention to improving eyewitness identification procedures, requiring the recording of police interrogations, and enhancing the reliability of forensic science. The Project

has also contributed to a significant shift in the national debate on the death penalty. Entrenched positions predicated on politics and morality have given way to an emerging consensus on the relationship between erroneous outcomes and irreversible punishment.

Peter's law firm represents victims of constitutional violations in which the cases have the potential to produce institutional reform. The firm's clients have included:

- Abner Louima, the Haitian-American tortured by police officers in a precinct bathroom. The civil case was the first in the Nation to hold a police union accountable for acts of brutality inflicted by its members.
- Two of the four young black and latino athletes wounded by New Jersey State troopers for the crime of "DWB"—driving while black. The case became instrumental in raising the Nation's consciousness about racial profiling.
- Thomas Pizzuto, who entered Nassau County Jail on a 90-day sentence for a Vehicle & Traffic Law violation but received a death sentence at the hands of correction officers. His death precipitated a federal investigation that led to a Department of Justice consent decree to implement much needed reform at the county jail.

Peter has litigated and taught extensively in both the "hard" and behavioral forensic sciences. Before co-founding the Innocence Project at Cardozo Law School, he taught trial advocacy at Fordham University Law School and was a staff attorney with the Legal Aid Society of New York. For the last decade he has served on the New York State Commission on Forensic Science, with responsibility for regulating all State and local crime laboratories. He has published more than a dozen articles on science and law, and is the co-author, along with Jim Dwyer and Barry Scheck of the book entitled *Actual Innocence: When Justice Goes Wrong And How To Make It Right.*

A 1972 graduate of the University of Wisconsin, Peter Neufeld received his law degree in 1975 from New York University School of Law. You can read about the Innocence Project at *www.innocenceproject.org.*

## DISCUSSION

Chair WU. Thank you very, Mr. Neufeld.

Before we get—we are now in the question and comment period of the hearing, and the Chair first recognizes himself for five minutes.

Before we get to other crucial issues like level of support, level of funding, whether to create a new independent agency or to perhaps approach that in a different way, and transition issues, it seems to me there may be some disagreement or at least difference in emphasis among the witnesses about the current state of forensic science. When I hit my first memo on this topic, I have to say that I was a little bit stunned. One of the sentences in that memo said with the exception of DNA matching, the commonly used forensic tests such as fingerprint analysis, ballistic testing, hair matching, pattern recognition and paint matching are based more on workers' experience than on rigorous scientific protocols. And I had the same reaction to that sentence that I did when I was visiting my local medical school and they were discussing evidence-based medicine. I had a very brief exposure to medical school in my training days and my first reaction was, gee, I thought all the stuff you all did was evidence-based. It took me a while to understand evidence-based medicine and what they were getting at. Perhaps the panel for our edification could discuss with me, or with us, your concerns about whether there is a sound scientific basis for many of the tests that we commonly rely on in our forensic testing, and I don't know if we want to go from right to left, left to right, or whether any of you want to proceed.

Mr. Neufeld, forgive me. I am reverting to my old Germanic past. I pronounced your name Neufeld.

Mr. NEUFELD. I appreciate it actually. Thank you. Very few people do but that is the right pronunciation.

I am not a scientist and I am not——

Chair WU. Your microphone.

Mr. NEUFELD. I am not a scientist and I am not the best person to answer your question, but these individuals who are on this panel all have, obviously, their own subjective experience and also their own special disciplines in the case of some of them which they may or may not wish to defend. The point of the National Academy report, however, is it is a blue-ribbon body of some of the best minds, not just in the forensic science community but in the hard sciences as opposed to, you know, in the basic sciences, which are not represented in this panel right now before you with the exception of the eminent physician who is sitting to my right. And what I will say is, it was their conclusion that it was lacking and we can't simply ignore that conclusion that is based on a two-year study that they did.

Chair WU. Well, realizing that you are not a scientist, perhaps we can come back to you at some point and you could address either examples or analytically what would be different if there were a scientific basis to some of the forensic work that we do.

Dr. Downs, would you care to address this issue? Does this make a difference or does it not, or is there a problem here?

Dr. DOWNS. Mr. Chair, I think it is a great question and your model of evidence-based medicine I think is dead on. In fact, in my written comments I address the whole source of that, which was the Flexner Report from back at the turn of the last century.

Chair WU. And the question here is whether we are at a similar inflection point for, if you will, a slightly different profession just as the Flexner Report and the reforms of American medical education made a significant difference. Is there a need to do something that dramatic in this field at this point in time?

Dr. DOWNS. I think for the sake of public competence that—the analogy I use is a racecar driver. They can win championships on the track. They have to go back now and get their driver's license and prove that they can do what we already know they can do very, very well, and I think there is good science behind all of the testing that we do. The problem is, we kind of got ahead of it and we never went back, because as Mr. Neufeld correctly points out, it came through a different venue. It came through law enforcement and the courts never asked us for that scientific basis as a starting point. We know it works.

Chair WU. That analogy is very helpful but walk me through with some specificity. What kind of difference would it make if we were to bring scientific or analytical rigor, if you will, rather than the contrasts with experiential work that we perhaps—the experiential approach with which we have brought to this in the past.

Dr. DOWNS. How does one make a call on a fingerprint? How many specific points in a fingerprint are required to call that a match? In the past that has been based purely on experience; when the examiner reaches a certain comfort level, they make the call. We don't have a way or metric to say it takes ten points of identi-

fication, twenty points. So there's no "scientific basis" for where that line is, and if we are to apply the standards like we do in medicine to say okay, we have these test results, therefore we can with confidence make this call, that is I think what we are trying to get to.

Chair WU. Do any of the other witnesses want to address this point?

Mr. Marone.

Mr. MARONE. Mr. Chair, I think to say we need additional research is the key, additional research. What has happened in the past has—research has been done at any number of levels, usually by the practitioners, the people working in the field, whether it be for firearms identification or fingerprints, and I will use firearms examination as the first example. There have been a number, literally probably hundreds of studies where individuals have taken ten sequentially manufactured barrels to see just how close they looked before we do anything to them and can we still differentiate them even though they have come off the assembly line one after the other. But the key is, those studies haven't been broad enough or have looked at enough issues, statistically analyzed. Maybe they didn't answer all the questions that an individual would want and so we need to take those same kind of studies, broaden them, make sure that all the questions, issues variables are answered, and that would give you the scientific basis. So a lot of the work is out there, it just hasn't answered all the questions. But what I can say is, of all the work that has been done, all the research that has been done in fingerprinting, all the research that has been done in firearms identification, nothing has led anyone to believe that it isn't proper, that it can't be done, which if you are going to truly look at it scientifically, that is a two-edged sword. Just because there isn't full validation, you can't jump to the conclusion that it is empirically wrong when you do have some research that indicates that there is some, you just need more work. So I think that is where we are.

There is a lot of research that has been done. A lot of it hasn't been published in technical notes and so forth, and it needs to come up to that same level of rigor in peer-review journals, and so forth, so that everyone can look at it, try to reproduce it, and so forth. So that I think is the issue that we need to make the research that has been done more broad based and more really attuned to what exactly the question is.

Mr. NEUFELD. Mr. Chair, can I respond to that for one second? Because I do disagree.

Chair WU. Yes, a response here, and then I intend to return to this issue because it is a core issue, but I am a few minutes over my time. With Mr. Smith's forbearance, go ahead.

Mr. NEUFELD. My understanding of the scientific method, and I am not an expert in it, I don't have a post-doc in it, is the burden is on the proponent of any scientific hypothesis to prove that it is right. It is not our burden to show that what they are doing is wrong, okay? They have to make out sufficient basis to demonstrate that something has been scientifically validated. That is number one. Number two, in response to what Dr. Downs said, could you imagine in a medical context, because he was talking

about fingerprints, if ten different examiners looked at the same cells and had ten different definitions as to whether they were simply abnormal as opposed to malignant? How could we have confidence in medicine if we had that range of opinion? It wouldn't work in medicine. It can't work in forensic science.

Chair WU. Well, Mr. Neufeld, I may not have a full understanding of medicine science but my impression is that with guidance from other sources that actually is what happens in imaging, that is, you see a pattern of shadows and light and, you know, based on 10, 100, 1,000 reads, you develop patterns and they become more analytically accurate with additional data but ultimately it is a match against that background.

Mr. NEUFELD. But you wouldn't expect that there would be 20 different opinions on the same data looked at by 20 different analysts, okay, and that is the difference that I am talking about.

Chair WU. That is absolutely correct. You would not hope for 20 different opinions.

Mr. NEUFELD. Right.

Chair WU. But you might get two very different opinions from two different readers.

Mr. NEUFELD. I understand that, and the third point of this is as follows. You know, what you did have in medicine at the early part of the 20th century was a commitment to sort of revolutionize and transform medicine in this country. You had the creation of the National Institutes of Health [NIH] with a very, very ambitious research agenda, and we have never had anything—I am not even talking about trying to do something as complex as that or as grand as that, but you have never had a kind of freestanding research agenda for forensic science, not just to validate that which is already out there, if it indeed can be validated, but also to encourage, okay, as I am sure this committee is concerned with, that kind of incubator for new technology, for new forensic science. What is going to be the next DNA, the next truth machine that we can build the industry out that will be very successful, not only in helping forensic science but also in helping commerce and exporting it? You know, we want a research agenda that can do all of those things and it is sorely lacking at this point.

Chair WU. We will return to this issue, and I will be asking tougher questions of the other perspective on this.

Mr. Smith.

Mr. SMITH. If you are on a roll, go ahead.

Chair WU. Well, I think that given the presence of other Members here, we want to get a round in the interest of fairness. Mr. Smith, please proceed. I am reining myself in.

Mr. SMITH. Thank you, Mr. Chair.

For all of the witnesses, the entire panel here, if you wish to respond, certainly there are a lot of technical recommendations in the report. What would stand out to you as the highest priority, if you wouldn't mind, starting with Mr. Marone?

Mr. MARONE. I don't think you have a single highest priority. They are very much leveled, if you will. If you look at establishing maybe a priority based on what can be attained first, not easiest, but with least problematic issues, moving on the accreditation and certification, certification of individuals and accreditation of labora-

tories. Those are two already vibrant, rigorous programs that are out there and can achieve significant gains in the community. The certification for the individuals and the accreditation because even though I said that, you know, almost 85, 90 percent of the laboratories are already accredited, one of the other issues that is out there is the other service providers. This is the ID section in a police department where they do fingerprint comparison, you know. There is not that much accreditation or certification out there, certification to a certain extent, but there is not that much accreditation out there. So by taking that first along with—and then education and somewhere in there you have to put in resources because we can train individuals, we can certify the individuals, but if they don't have the equipment or the people to provide the analysis at the other end, then we are at mixed purposes.

So your question, I am not trying to go around the circle, is we kind of need them all and they are separate lines that can be done in parallel, the accreditation, the resources. Laboratories are just up to their eyeballs in casework. We have got to fix that, and it is not a quick fix, well, we give them a whole bunch of money for overtime, or we outsource to provide laboratories or so forth because that only fixes it now and then two years from now we are right back in the same situation. So the resource issues, the accreditation and certification goes a long way towards a lot of these other issues as far as competency, effectiveness of the analysis and so forth. You look at a lot of the recommendations and they can really be subsumed into one, all the quality control issues into accreditation and certification. Those all can be covered by those programs so I would place those first and then education and certainly resources. You pick which one you want to do first.

Mr. SMITH. Any estimate of cost?

Mr. MARONE. If I had that answer, I wouldn't be here right now speaking in the capacity I am. I would probably, you know, have a global conglomerate answering that question to everybody. You know, we look at what has happened in DNA and the modest, relatively modest now, amount of money that has gone to DNA analysis in the five years that it has been. We have seen tremendous progress as far as capacity enhancement and backlog reduction, and really let us not worry about how much actually was in the appropriations, how much money made it to the laboratories, and it was probably $50 million, maybe $60 million a year, and yet we saw progress. It is still not enough but we saw progress. So multiply that by all the other disciplines.

You know, I hesitate to throw a figure out because then somebody runs with it, you know, and everybody is throwing out trillions of dollars now. I don't think we have any idea what this cost may be. Certainly accreditation, several million dollars for accreditation, anywhere between $5 million and $50 million to make accreditation happen, and that is not counting the cost from the laboratory's perspective, the time that they must spend preparing for that. The same thing for certification. We have no—I have no idea how many—how much it might cost but, you know, it is a large figure, if that helps you. You know, we batted that around the committee and it is like there is no way to do that. You have to first find out what the issues are before you can figure out what it is

going to cost, what the numbers are, and we have yet to define the number of service providers outside forensic laboratories, how many PD ID [Police Department Identification] units are there and so forth.

Mr. SMITH. Thank you. Anyone else?

Ms. HENDERSON. Yes. I think what we really need to do is do a strategic plan and I think this is—my learned colleague at the end of the table and on this end of the table as well. One of the things that we need to do is, what are our priorities, and I think that is the key. You know, the NAS committee listed things, they have recommendations, but there is no strategic plan put forth, and I think that is very critical, and also I have to say with Peter, research is critical. If we don't know what is going on in all the different disciplines, and this is what is interesting about forensic science. We are a multidisciplinary group. We are not like anything else. We are not like medicine, although we have, you know, forensic pathologists like Jamie with us, but we have so many different diverse groups within forensic science. But a lot of research could be done and in fact that is where you take the institutions, for example. You could use universities and work in conjunction with laboratories because the laboratories are taxed. They are overtaxed with many things that they have to do, and I think Pete is correct. We don't know how much money this is going to cost. We have to take a look—what is in existence, and that is why I said let us start with some immediate action like what can we do with existing things that are in place like accreditation and like certification programs. There are quite a few of them. And then work from there to improve, identify the research priorities and then move forward. I think that would be practical, which is one of the things in this economy we need to do.

Mr. SMITH. Thank you.

Dr. Downs.

Dr. DOWNS. I think I agree with what my predecessors have said. I would also say I think that as a practical matter, given that the courts are relying on this fingerprint evidence and firearms evidence, for example, and the other pattern evidence, that we have to validate that science for those purposes, for courtroom purposes because that evidence is already "in process" and we have people waiting for trial. We need to address that issue, I think, as one of those initial priorities.

Mr. SMITH. Mr. Hicks.

Mr. HICKS. I would just like to voice my agreement to all that has been said here so far. I think it is—the elements are there to draw upon, you know, to enhance and to help address some of the critical questions that have been raised. I suspect much of that information is already there. It just needs to be put into a package and appropriate form and then subjected to scientific scrutiny. That would be helpful for the courts. But it ought to be recognized, I think, the context of how some of these now-called sciences evolved, fingerprints and firearms identification, fiber identification, things like that. I mean, this was all investigative techniques. These were undertaken to try to help bring some information about a criminal event that has taken place.

So one of the first roles that the crime laboratories initially had to face was just simply identifying the white powdery substance as a controlled substance meeting the critical element of the law, so that of course involved in chemists being hired at the laboratory. But prior to that, the question of trying to reconstruct the criminal event and trying to then test what can be observed at the crime scene based—test that against the statements of witnesses that may be there and again trying to assess and reconstruct just exactly what took place before it is then decided whether there are any charges to be brought and how that would proceed in court.

So consequently, a lot of the development, particularly of the pattern-type recognition, the observation-type techniques, such as fingerprints, such as firearms identification, other things like that, evolved in police departments probably from investigative personnel and not so much scientists and then—but in my estimation, through the years, through organizations—forensic science organizations as these individual techniques have evolved, the agencies had brought in people with scientific backgrounds as they have recognized that need. They probably were surprised when they first arrived at the level of sort of scientific underpinnings there and I think there has been a lot of work done by a lot of people to try to address and assure themselves that they were offering opinions confidently in their individual cases. So that is where I think again NIST would have the—again as a short-term, efficient, quick kind of response kind of a thing, they have the capacity to look at information that has been developed, identify where the gaps are and, where additional information is needed, and might be able to try to more aggressively and quickly and directly address some of the most critical comments found in the report.

Mr. NEUFELD. It has been said that for a lot of these disciplines that there was plenty of scientific data out there, we just didn't collect it. One of the specific requests that was made by the National Academy of Sciences during the time period that they had this committee up and running, and they had public sessions was they invited people to come in and actually produce the scientific data that folks were referring to. And I will just use this as one small example. Under the odontology section on bite marks, they reached a conclusion, "The committee received no evidence of an existing scientific basis for identifying an individual to the exclusion of all others." There is another report I read which——

Chair WU. I am sorry, Mr. Neufeld. What methodology were you referring to there?

Mr. NEUFELD. The odontology, bite marks section, for illustrative purposes. There was a lot of talk in the report that a lot of these problems were known about back in 1999 when NIJ did a study, and another report that was done in 1995 and one done in 2003, and I think it is shortsighted if we simply believe that we can quickly deal with a couple of these problems and then things will be okay. When I read this report, the one thing I walk away with is that it won't be okay, that in fact what they are saying is because no one has ever demonstrated the will or the vision to do these things before, that you really do need a single entity, which they call a National Institute of Forensic Science, that can coordinate all these objectives. Yes, once that is up and running they can

prioritize, they can decide that, for instance, some of the disciplines that Mr. Hicks and Dr. Downs were referring to are the ones that need to be addressed first. But you still need this national entity that can look at the financial needs, for instance, of all the various crime laboratories that Pete Marone was talking about.

One of the fundamental problems we have seen in forensic science, and I don't think there will be any disagreement in this panel, is there has been kind of a balkanization of forensic science in America so people have to go to 20 different pots, people have to deal with 20 different organizations, and it would be much better if there was a single entity that could coordinate all of this and it could create its own priorities for research, for giving out the federal money, for doing all those things that you would expect to do if this is to be a science-based undertaking.

Mr. SMITH. Thank you very much.

Chair WU. Thank you very much.

The gentlelady from Maryland, Representative Edwards.

Ms. EDWARDS. Thank you, Mr. Chair, and thank you to the panel. I would say I do look forward to at some point in the future hearing directly from NIST about some of the analyses and recommendations and the way that they believe they can play a continued role in the good work that they are doing out in the fourth Congressional District in Maryland.

To Mr. Neufeld, I really appreciate—and I have been pronouncing your name apparently wrong since 1992, but I appreciate the work that you have done. I had the great fortune when I was at the Arca Foundation of being able to support some of the work of the Innocence Project and all the projects around the country looking at DNA and obviously other evidence that resulted in people being wrongfully convicted, particularly of capital crimes and serving life terms and facing execution, and I just think that the work that you have done with this new technology has been an amazing revelation into our criminal justice system and the way that it sometimes can fail people who sometimes are of little means and don't have the ability to defend themselves, so thank you very much.

I have a question really that relates to funding, and while you may not be able to project the amount of resources that it would take to do this work, I wonder if any of you have any estimates across the federal landscape of the amount of resources that are already being spent in forensic sciences and technology. Because I think with a lot of things, we are not always in a position here in Congress of creating a new agency because we have a new field, and that in itself could be very expensive and maybe not even very productive. I look at the work, for example, around climate change that is actually taking place across—which has a number of different kinds of disciplines contributing to the field and taking place across many different agencies and now with some greater coordination out of the White House and so I wonder if you could comment about a way that we can—and particularly Ms. Henderson—about the way that we can look at the work that is in front of us and the recommendations which I think are important, but that we can use some existing resources or build on those capacities rather than creating a separate federal agency.

Ms. HENDERSON. Well, I think if we look at what is existing and then we would have to look, of course, at the latest legislation that is out there but, if you have to look at different entities, it is going to be NIST, it is going to be NIJ. There are forensic capacities that are being utilized in the Department of Defense [DOD]. There is the Department of Homeland Security. See, that is the thing. As Peter pointed out, there are many little pockets out there with different resources, and in fact sometimes there is—and this goes back to what Pete said too. There is research that is being done that we in the forensic community are not privy to because it is in Department of Defense or something and that is not out for peer review, for example. So I think if we look—and I think, Pete, you had mentioned something about that in the new economic stimulus package. There is between $4 billion and $5 billion. Is that correct?

Ms. EDWARDS. But do you have an idea across federal agencies of the resources? Maybe that is something that we need to figure out to get a better handle on. Whether the resources that you are talking about that would be used, perhaps, even to create a new agency already in existence, and maybe there is a way to figure out a coordinating role among these agencies, even the ones that are out of our hands in some ways like Department of Defense or Homeland Security.

The other question sort of goes not so much to the funding levels, but what type of coordination do you think is necessary even across, you know, the ones that we know about, FBI, NIJ, NIST?

Ms. HENDERSON. Well, I would like to talk about that because when I was the President of the Academy, one of my sub-themes was collaboration, and sometimes there isn't as much as we would hope for in the forensic science community, but I think now we are all saying we must all work together. I mean, this is a diverse panel if you look at us and we have come to the table, so to speak, because it is of such concern both for the justice system, and I am saying both the criminal and the civil justice system. So I think what we have to do is identify all the resources that are available. We all want to make sure that justice, both civil and criminal, are successful, and we cannot do that unless we identify what is available now. Don't duplicate efforts. I think that is a waste of everyone's time. And we have to be cognizant of what our economy is looking like these days. I mean, we cannot ignore that and we are suffering across the board here whether we are in education, the Innocence Project, in a crime laboratory, you know, pathology work, all of that.

So I would say the first thing probably to do is to identify the pots of money, who is working on it and then can we bring people to the table. I don't know whether, you know, people have to be dragged kicking and screaming or not. I am hoping not, since I think we are all trying to collaborate at this point.

Ms. EDWARDS. My time is up, and I think this is something that we actually do need to explore and then we can look at the set of short-term recommendations that we could follow through on right away even though we may not be able to quite reach the long-term yet. Thank you, Mr. Chair.

Chair WU. Thank you.

The gentleman from Georgia, Mr. Broun.

Mr. BROUN. I thank the Chair.

Let me give you a little background about me. I am a physician from Georgia and so Dr. Downs might be able to understand what I say. If you all need some interpretation, he will be glad to do that, I am sure.

Mr. Marone said that NIST does not have all the package, and I am concerned. I would like to see a show of hands, please. Some of you seem to be promoting a new National Bureau of Forensic Science or new agency. Who of you all's group are proposing a new national bureau? Would you please raise your hands? Okay. Three, four, one not. Okay. Of the four that are proposing a new national bureau, why not in the private sector? Why not in the states? Why can't this be done? Because I am as a scientist seeking truth all the time. When I graduated from medical school, the Medical College of Georgia in Augusta, I was taught things as being absolutely true. Three or 4 years later, through continuing medical education, I found the opposite is true, and I can give you many examples of that, and that is true with all of science and we have to have peer review and we have to have the independence that Ms. Henderson was describing, and having that independence is extremely important as far as I am concerned to make sure that we don't convict people who are not guilty. I want to put the guilty folks in jail and make them pay for their crimes and I want to make sure that people not guilty are exonerated if they are charged.

So why not do this in the private sector? We have got two competing forces here, the district attorneys, the prosecutors on one hand, the defense attorneys on the other with a lot of money involved on both sides at the local and State level. Why not allow market forces to develop this kind of scientific inquiry to find the truth and the new truth as it develops? Mr. Hicks?

Mr. HICKS. Well, I think the—again, because this is driven typically by the D.A.'s, I mean, they are the ones that—and the police investigators at the crime scene—they are the ones that have the need to try to gather the kind of information that will help again reconstruct the event, establish elements of the crime, maybe link the suspect and the victim together. So it seems to me that is where the need is going to be defined. And then whether or not you can turn that to the private sector, I think you probably could. I think maybe that is where NIST actually is kind of uniquely positioned because they are involved with the private sector to a great extent, and it just strikes me that if given this role with respect to the forensic activities, as these new needs are defined and emerge, they may recognize opportunities in the private sector that can be brought to bear on those. And of course, just as with DNA technology, while the significance of the technology was recognized early on, but having the reagents, the testing equipment, all the supplies necessary for performance in the laboratory, these all had to be communicated with the private sector and so there was, you know, a lot of interaction there at that time. The private sector was eager to find out what the needs were because, I think, they too recognized the potential for growth in that area.

Mr. BROUN. Thank you, Mr. Hicks.

I would like to ask another show of hands, who of you all out of the panel have read and studied the Constitution of the United

States? Could I see hands? Okay. Four or five of you. I carry a copy in my pocket and I believe in this document as it was intended by our Founding Fathers. Could you all show me somewhere in this document where we should develop a new bureau of agency of forensic medicine or forensic science here in the United States? If you all could show me that, I would appreciate it.

Ms. HENDERSON. Actually Peter would probably say something like we could look for a penumbra, right, or a shadow within some of the Constitutional amendments that say that we—to protect people's rights that we would be able to have something like this. Peter?

Mr. NEUFELD. Congressman, if I may, I also wish to respond to your last question because I think you raised a very good question, and I actually do believe that the private sector can play a huge role in doing a lot of the research that you are describing, but the one overarching principle that came out of this report, and I think there is no disagreement on this panel, is that whatever fixes need to happen have to happen upstream of a courtroom, that historically defense lawyers, prosecutors and judges have not done a very satisfying job of separating the wheat from the chaff when it comes to good science and bad science in criminal cases. I would be more than happy to send you a peer-reviewed article that I wrote last year on that specific subject, and what you will see is that even the very famous Daubert decision that came down in 1993 is not really used in criminal cases, very, very rarely, and that it is believed by everybody here that if you can get this stuff right before it ever gets into a courtroom, then we can all have much more confidence in what goes on, and you can't simply leave it to the so-called crucible of the courtroom to work it out.

Mr. BROUN. Mr. Neufeld, I appreciate that. My time is about out. If the Chair would just permit me to make a statement, then I will quit.

Chair WU. Absolutely.

Mr. BROUN. Back to my question about the Constitution, unless you look at a perverted sense of the Constitution, you will not find in that document anywhere Constitutional authority to develop a new national agency or department of forensic science. You won't find it. But we are operating here on the perverted idea in Congress, the courts as well as the Administration whether it is Republican or Democrat, all seem to operate on a perverted idea of what the Constitution is all about, and I find that very regrettable. But as a scientist if I am extremely interested in finding truth whether it is in forensic medicine, forensic science, just even medicine as I still practice or not, but I don't think we are going to have the intellectual freedom with a new government body because there is going to be government control over that body, and I encourage you to think long and hard before continuing to promote a national body. NIST does a great job of setting standards and I think we have other opportunities to develop truth in the forensic areas without developing a new body, and we frankly don't have the money now to develop these new standards. So I encourage you and others to look at—we have got to solve the economic problem in America and developing new bodies and new bureaus and other things, maybe they are nice and maybe they are not Constitutional

but we would want to do that. I think there are better ways than trying to look at that, and let us find those solutions because I don't want anybody sitting in jail who is not guilty and I want to know the truth as a physician.

So I have other questions I will submit for you all to answer and I appreciate you all's time and I thank the Chair.

Chair WU. Thank you, Mr. Broun. I am sure that we will be able to get back to you on a second round of questions if you would like, and I would like to thank the gentleman from Georgia for giving me the opportunity to pull out my hip pocket copy of the Constitution. The argument is typically that article 1, section 8 provides various authorities. There is a specific authorizing provision in the Constitution for NIST to provide a system of weights and measures for the country but I just want to point out, because this issue has come up in my Congressional district repeatedly, usually with respect to Social Security or Medicare about Constitutional authority. I just want to point out that there doesn't appear to be textual reference to NASA or to the Air Force in the Constitution either but we have seen fit to stretch it in each instance, and this is not to engage the gentleman in Constitutional debate at this point but we perhaps could continue the conversation over lunch sometime.

Mr. BROUN. If the Chair would yield a moment?

Chair WU. I would be happy to yield.

Mr. BROUN. I would love to have that opportunity to have lunch with you and discuss that, but from my perspective, we are operating governmentally in the Congress, pretty much throughout the Congress as well as in the federal court system as well as in the Administration on a perverted idea of what the Constitution is all about, and I believe in the original intent of the Constitution. National defense is Constitutional so therefore the Air Force and NASA and some of those other things that were not specifically mentioned fall within the aegis of national security and national defense. NIST certainly is one of those things that I agree we need to have the national standards, and that is the reason I would like to see NIST take over some of these things to make sure that the science is correct, but here in this committee, throughout Congress, we hear people talk about the climate change and global warming that is absolutely certain manmade and there are many, many scientists across the world who say that is absolutely not true and there are scientists who look at all things, in my medicine, my field, and others, and there is always debate, and that debate is good in the scientific community because that is what peer review is all about, and I think it would be critical for us to continue in forensic science back to this issue so that we have that independence and have many entities looking at these various things whether it is DNA testing or bite marks or other entities so that we get the truth and continue to seek that truth. Having one federal body that is focused on this is I think counter to good scientific inquiry, and besides being un-Constitutional in my opinion. So let us have lunch and we will talk about that further. Thank you.

Chair WU. I thank the gentleman.

Mr. BROUN. I thank the Chair.

Chair WU. Reclaiming my time. While the gentleman from Georgia and I may have slightly different Constitutional interpreta-

tions, I think we share a concern about whether the creation of a new agency at this point in time is the appropriate response, and I would like to get to that after we return to mining the subject of the core concern about is there sufficient science, where is the science behind forensic science, what difference does it make. I am still trying to understand the core concern here, and forgive me if I am a little bit slow, but it appears to me that with DNA evidence we had a body of science that was developed independently of any forensic application and then a forensic application was found and eventually solidified, but DNA is something that we have been working on since the 1950s, maybe even a little bit before, but there is an independent body of work. What Mr. Hicks seems to indicate is that a lot of the methodology developed in forensics stems from investigative work and is experiential and a body of work that developed over time and pieces of it have been—pieces of it are supported by research, other pieces remain perhaps more experiential. Am I beginning to understand the picture here, Mr. Hicks? Would you care to expand on that?

Mr. HICKS. Yes, I think you have hit it right on the head. That is exactly right. And as Peter mentioned earlier, I don't know what the response was when they invited those practitioners in those fields to come forward with information. I suspect that they didn't. I suspect part of it may have been an issue of trust and a question about where is this going, who are we giving it to, and knowing that they operate in a very adversarial environment of the courtroom all the time. But the other is that it may just not have been in sort of the more formal scientific forum as well. And that is where again I think if people who are trained and have the experience in that type of activity, if that could be brought to bear on the existing information—and there will be gaps, I am sure, identified and holes identified and——

Chair WU. Can we try to bear down on the issue of what difference would it make? Now, Mr. Neufeld gave a very graphic example of 200 innocent individuals exonerated by DNA, let us say, who were convicted, subsequently exonerated, and out of those 200 perhaps 100 perpetrators who were, if you will, loose on the streets because of the wrongful incarceration of the 200, that 100 real perpetrators, if you will, were loose longer. I mean, that is one graphic example of a difference that it would make. There seems to be different levels of challenge as to different testing methods whether it is ballistics or bite marks or hair or paint chip analysis. Can the panel further address for me examples of what difference it might or might not make to the judicial process if we were to apply science more broadly to what has historically been a collection of experiential data points?

Ms. HENDERSON. Mr. Chair, if I could respond. One thing, and I think Peter pointed this out also, we have to remember in the criminal justice system only two to four percent of the cases ever go to trial, so we want to make sure that—so we are not really able to cross-examine and challenge many of these issues because things are pled out, there are all kinds of other things that go on. I would say because we have such a diverse area in forensic science, like Dr. Downs, pathology is not really—I don't think there are really challenges to that as much although there are some, like shaken

baby syndrome, and things like this come up as theoretical debates and also are challenged in court. But then we have the pattern evidence area and I think that is really when we look at the NAS report, they are looking at what we call pattern evidence. We are looking at fingerprints, we are looking at bite marks, we are looking—see, paint and things like that, we have chemistry. I mean, that—again, there is not as many, I think, attacks on toxicology, on chemistry, drug chemistry. I mean, there are always new methodologies that are developed.

Chair WU. Are most of the problems focused in these pattern areas where we seem to have, if you will, a statistical problem?

Ms. HENDERSON. And you can't—I would say one thing, that they have not—you can't really have statistics in some of these areas. There are actually in tool marks, for example—I will give you an example. Somebody comes to pry open, you know, your sliding door and then they have someone come from the crime scene to say, here, we know that this is the pry bar that we just found in this person's car to pry open that door. There is a debate whether you count striation marks. I mean, there are two theories of this. One group says we don't need to do that. The other people say—so within—and again, that is like science. You are always debating in science, coming up with new methodologies. So there are actually—and like Pete pointed out with the knife patterns, that is another one. They have all kinds of pattern evidence with tool marks but it is highly debated. So I think I saw, at least when I read the whole report, the more the challenges are in the area of what I would call pattern recognition forensic science, but not in some of what I would say forensic pathology, toxicology, drug chemistry and areas like that, and I don't think that is really where the concentration was in the report.

Chair WU. Help me understand that. Where there are things like toxicology reports and chemical analysis of paint chips, do you all agree that those are more settled procedures and less doubt about them? Mr. Neufeld.

Mr. NEUFELD. I agree with your original comment that the biggest problems occur in those so-called matching disciplines, pattern disciplines, but there are other types of problems in the way that they are actually implemented in the criminal justice system which you should be made aware of, which are in the NAS report. For instance, since most cases don't involve DNA, we all agree on that, and we all agree that most cases don't go to trial. Most cases are either dismissed or resolved by a plea of guilty and so therefore in most cases the people who are the principles, the lawyers and the defendant and the victim, are looking at a lab report, a piece of paper, and there are no national standards on what goes into a lab report. And one of the things that the NAS report calls for is there needs to be national standards so whoever reports the report can figure out what happened.

Chair WU. So even where there is, if you will, more science as in chemistry, there are certifications issues about the accuracy of the lab tests. There are issues about procedure. There are issues about the format and the content of various reports.

Mr. NEUFELD. That is correct. Thank you.

Chair WU. And nobody disagrees with that. But is there still consensus that there is a much bigger problem in the pattern recognition fields like ballistics, bite marks, fingerprints? Dr. Downs.

Dr. DOWNS. I think what we are looking at is a couple of issues that overlap. One is the fundamental scientific testing, the reproducible number, and I am going to probably get my good friend, Mr. Neufeld, upset, but he refers to "DNA exonerations." To my knowledge, DNA has never exonerated anyone. It has been used for that purpose but it is only a test result, and we have to place that test result into context. DNA has never convicted anyone. It has been used and interpreted for that purpose but what we are talking about is the metric of actually performing a scientific test.

The accreditation and certification goes to the scientist practitioner—that they are actually qualified to interpret that test result and put it into the context. So I think that part of the report, that you need to have both of those together simultaneously because the reports need to be understood. They need to be understandable. Someone needs to be able to read my report and understand why I made a determination.

Chair WU. Well, Dr. Downs, I think that we are in agreement that if there is a sound methodology, one still has to have a sound practitioner and have standards for the form of the report and the content of the report.

Dr. DOWNS. Yes, sir.

Chair WU. So we are in agreement on that, and there is a certification issue here and a standard-setting set of issues. I am trying to get back to, are there core issues with some of these technologies that we use that have a deep history but perhaps have not been analyzed in ways that we would consider supported by lab science? Ms. Henderson?

Ms. HENDERSON. Yes. Actually this brings up another issue which I wanted to touch on is education.

Chair WU. Can we finish this one first?

Ms. HENDERSON. Yes. Well, that is what I am getting at. I am going in a circular fashion right now. No, actually it is education because lawyers for a long time—these things weren't challenged because lawyers did not have science backgrounds. Only 5.3 percent of law students have any education in physical sciences. So now that people are getting, I would say, up to speed in whether it is computer science or something else, now there are many more challenges that are being made, and for a long time fingerprints were never challenged, tool marks were never challenged. It was a given that this is good science. But then when people started asking well, where is the rigor, where is—and there is the very famous case that took place in Philadelphia with fingerprints. It was the first time that somebody in federal court challenged a fingerprint, and this was in a bank robbery case, and all of a sudden people said well, where is the data, we don't have anything that supports that the fingerprint evidence is really valid. So I think that is where we are looking, and these are many cases. I mean, if you go to my website, *NCSTL.org,* we have cataloged all these types of cases that say here is where the challenges are and that is again, I think—really what we are seeing is the challenges are being made in things that, as John said, developed through law enforce-

ment but then didn't have the rigor until the attorneys started getting educated, and they are still not that well educated, I have to say, in most science, other than Peter Neufeld, of course. But, you know, that is one of the things, and he has been doing this for years, but other people are not being trained in that particular area. So I think the rigor needs to be imposed in many of, I would say, traditionally accepted pattern evidence areas and that is what the report says.

Chair WU. Thank you, Ms. Henderson.

Mr. Hicks, you headed up the FBI crime lab. Have we just been taking on faith these fingerprint matches, these bite mark matches, and if you drill down to really focus on: is there evidence that a match is a match, do we have problems when we actually drill down and start asking those questions?

Mr. HICKS. Well, of course, I am not an expert in all those areas, you know, to that extent, but it is experientially based and I think if you were to speak with someone who has worked in that field for some period of time, they have confidence that they are able to distinguish patterns. But again, there are so many uncertainties in an actual forensic evidence case, for example, fingerprints. You may not have a full, clear image. You may——

Chair WU. But, I mean, a full fingerprint is a full fingerprint, but the problem is you are frequently working with something a lot less than that.

Mr. HICKS. What you are faced with, right. And so that is where the—as Pete mentioned earlier, about the quality assurance practices where you do want to be sure that you have some level of redundancy in your analytical system. You have a confirmation process maybe where somebody else looks at it and verifies, at the very least reviews, the work done to agree that they come to the same opinion. And can errors happen? I think they can as has been demonstrated and undoubtedly will in the future. Errors even happen in medicine with all the rigor that is behind that. So I think that is where the quality control process and the accreditation process of course supports that to be sure that you have systems in place that help to detect when things go wrong or inconsistent, you know, with what the sort of established community standards.

I think if you were to go—I mentioned scientific working groups earlier. I think if you go to the FBI website, for example, and then look at some of their publications, Crime Laboratory Digest, for example, is one of those publications, and you will find on there listings of recommended guidelines for fiber identification, for example, fiber matching, and it will go to the level of what should be included in the report. It will talk about the kinds of tests which should be at least considered and applied, although not all tests would apply in all circumstances, but at least it defines which tests will provide certain elements of information that might help to resolve whatever question it is they have been put to.

Chair WU. Mr. Hicks, in those fields where the FBI does have guidelines, in your professional experience, what percentage of tests submitted in those fields where there are guidelines do you think actually meet those guidelines?

Mr. HICKS. I am reluctant to even hazard a guess. I don't know. It has been—first, with the FBI, it has been a long time since I

have been there. Much has changed in the last 10 or 15 years at the FBI as in all laboratories—the entire community, in part because of the DNA experience.

Chair WU. Yes, this is why we are spending a bit of time on this because frequently when you focus down on an area, as a legislator I don't get to do that nearly as often as I want to, what is there is not what one fully expects and many of us strive for original intent or for truth but it is a little bit slipperier than being able to get it on the first pass. I guess even though I didn't—I don't think I have ever seen the TV show. I perhaps fell in the same trap of assuming that because folks said it was so, it must be so, and I am beginning to wonder if it ain't so and whether we should be asking that question more consistently.

Mr. HICKS. Well, I think, again, it is a question of being in the forum that is expected, and that is again why I keep getting back to NIST. I mean, they have the competencies to help make that assessment, to look at that kind of information and working with the laboratories and the scientific working groups of experts in those individual fields, people that are at least practitioners in the field to draw together what information is there and put it to that kind of scrutiny, and I suspect that there will be many areas where they can find that there are some gaps that need to be filled. Some areas might just be simply a matter of conducting—refining the scope of the study and performing the study in a slightly different way to get to the very specific questions being asked.

Chair WU. Well, I want to get to the other Members for another round, and I will continue this, but I just want to comment that it disturbed me greatly when I made the transition from a science background to law school and then it took me a while to figure out how the paradigm had shifted because in science you kind of work at something and you have competing hypotheses. Until you collect the data you don't draw a conclusion about which of the competing hypotheses one should proceed upon. With law, with judicial process or the legislative process, it is really quite different. There is a deadline and there is a deadline for decision. There is procedural fairness but one has to reach a decision by the deadline and you make the best choice you can under the procedural rules and then you live with that decision until something else comes back and you reverse it. It was very unsettling to come to that conclusion. I am still not sure that I am fully comfortable with it but I am not sure that there is any way to proceed in our society without those deadlines. I am still going to come back to this topic before getting to a few crass administrative things like cost and transitional issues.

Mr. Smith, you have been very patient. Thank you.

Mr. SMITH. Thank you. Actually I find this interesting and I appreciate the expertise that you bring. That is, I think, why we have these hearings and I am grateful for the opportunity to participate.

We have got progress of science and we have got a criminal justice system. Are they keeping up with each other? I mean, Mr. Neufeld, you cited over 200 cases and I certainly commend your organization for striving for a better way, if you will. If we used today's system that is most often practiced, I mean each state would probably have a little different way of doing things but if we ap-

plied today's practices to those cases over the last several years, I am not real certain with the timeline of all of those cases that you mentioned, but have we made progress? How are we doing, say, from the 40,000-foot level?

Mr. NEUFELD. You have made progress with respect to those cases which would be resolved through DNA testing, but as—because DNA is that robust. But again, as everybody on this panel will tell you, the types of cases which lend themselves to DNA is a very small minority of what goes on in a crime laboratory or what goes on in the broader area called forensic science. Many of the same disciplines that gave rise to the wrongful convictions are still practiced today and they are still practiced today much the same way they were practiced five or ten or fifteen years ago. They haven't changed, and that is one of the reasons why there is concern for a new initiative because others before have failed to have that initiative to make the changes. Okay. People knew, for instance—and I am not going to—John Hicks was an expert in hair microscopy which the Chair asked him about, that is, looking at hairs under a microscope, a hair from a crime scene, and comparing with a hair or hairs from a suspect and seeing whether they are similar. They would look at, you know, perhaps a dozen or more variables, and I will defer to him on what the exact number is. But the problem is, they never had any empirical data as to how common or rare each of those variables were. Nevertheless, they would make statements in courts of law about how unusual it is to find two things that are similar or common without any database, without any empirical data, and to a large extent the problem with a lot of these so-called matching disciplines is they lack empirical databases to allow people to create a statement about an association, and that is still a problem today. It hasn't changed. And it is not getting any better in the courts because judges don't deal with it any more adequately and the lawyers, the defense lawyers and prosecutors, don't deal with it any more adequately because if they had done well in organic chemistry they would have followed Mr. Wu to medical school as opposed to me to law school. It is that simple.

Chair WU. Mr. Hicks, do you want to respond?

Mr. SMITH. Go ahead.

Mr. HICKS. Well, again, with hair identification you are looking at features that may help to distinguish one person from another but always in the reports that were issued there was a disclaimer more or less, a warning statement put in there, that this is not an absolute means of identification, and so it should be viewed in that light. There may have been circumstances where the hair had been artificially treated, for example, repeatedly where it would add some level of uniqueness. At least in the experience of the examiner it would seem to be something that they had rarely observed and that might be offered during the course of testimony there to—but I am not aware of any instance where there was testimony given in a hair case, maybe Peter knows some, but some instance where it was given that this is an absolute match that nobody else has. It was always considered—urged that it be considered in the context of other information. And so, for example, in some cases, it might have been a fiber case, for example, if you find a blue

nylon fiber on a victim, on a homicide victim, and you find a suspect that has a blue nylon sweater. That may be some association but of course there are many sweaters that might have been produced like that so that I think intuitively most people would recognize that and wouldn't have difficulty understanding that that is not an absolute association.

On the other hand, if you have a case as in Georgia, the Wayne Williams case some years ago, the Atlanta murders case, as it was referred to, where there were a number of young men who were found killed and there were many different fiber types that were found, 28 different fiber types, in fact, that were consistently found on the homicide victims and there was at the suspect that was eventually developed sources for those fiber types were found in one location. Now, was it an absolute identification? I don't think so. There was an effort to try to develop some statistical estimate of how likely it might be that type of circumstance might occur. But that is the challenge again. In forensics, you don't know what you are going to be presented with, and the whole idea is to try to assess and reconstruct what you are observing and to see if it might help bear light on a particular investigation, particularly either to corroborate or dispute eyewitness testimony that you might have or other facts and circumstances that you have. It should always be considered in the context of the whole case, and I think that is what you had gotten to earlier, I guess. Of course, that is sort of the legal requirement to look at the totality of things and assess whether or not you can come and make your best decision based on the information you have. In some respects, that is taking place to some extent in some of those types of experiential types of practices in some forensic labs.

On the other hand, hair identification, the cases that Peter is referring to where they had success in reversing these convictions, those are convictions which occurred 15 or 20 years ago prior to the advent of DNA technology typically. If you were looking at a forensic laboratory today, I suspect there are a few that actually end with the microscopic observation of features of the hair. Now they would typically use that only to identify hairs which might be good candidates for DNA analysis. So rather than analyze 20 different hairs recovered in the debris from a crime scene, they will focus on one or two that seem to be similar in appearance maybe to the hair from the suspect source that they are considering but then they would isolate those hairs that looked to be the best candidates for a potential DNA match and then pass that on for DNA confirmation.

Mr. NEUFELD. You know what? Actually it proves too much because even when you talk about a combination between hair and mitochondrial DNA, you have the National Academy of Sciences explicitly reporting on page 5–26 of their report, but no studies have been performed, referring to mitochondrial, working with hair microscopy specifically to quantify the reliability of their joint use. The problem is, frankly there are dozens of cases that we have where people were wrongly convicted based on the inappropriate use of statistics in those hair microscopy cases and sometimes it was FBI agents themselves who actually offered these statistics completely in the absence of any empirical database. That is docu-

mented in transcripts. We can share them with the panel. It is not at all controversial.

But there is a bigger problem. Even if you don't do as we did in the case which I submitted to the panel, say giving a number of one in 10,000, even if you say that something is more likely than not to have come from this individual, that in itself, even without giving a number, is a probabilistic statement and you can't give a probabilistic statement unless you have some empirical data. So it is not enough to say that we would have a disclaimer that we will not say it is this person to the exclusion of the rest of the world, but when you give any statement like that, it most likely hairs or more likely than not hairs, that is a probabilistic statement and you can't make those kinds of statement in the absence of a scientific empirical database, and they never had it.

Mr. SMITH. Ms. Henderson?

Ms. HENDERSON. Yes. I thought Peter might cite to the—was it the Williamson case that was in Oklahoma, I believe, or Texas. There have been cases where they have said something was a match with hairs and fibers and they said you cannot do that. It is true, as John says, there are some, you know, evaluations, improvements now with hair and fiber evidence, but a lot of laboratories have done away with microscopy. They just said we don't want to do this anymore, instead we are going to see if we can do mitochondrial DNA testing, we will do that on the hairs but we are not going to go ahead and just say it is microscopically similar because there is not the data.

Now, one thing I wanted to point out though, when you asked before about whether—how reliable certain areas were, there was a publication in the *Journal of Forensic Sciences* on proficiency testing. They went back to 1978 and looked at—Joe Peterson is the author of this particular article and he has done an update. He started in 1978 and looked at proficiency testing in every area of forensic science and their reliability, and I have to say hair and fiber was one of them. You might as well as have flipped a coin. In fifty percent of the cases they made misidentifications and so that is I think something that—and I can provide that to the Committee if they would like to look at this particular study.

Chair WU. Ms. Henderson, can you explain that to me a little bit further? I don't know what you mean by proficiency testing.

Ms. HENDERSON. Okay.

Chair WU. And when you say 50 percent is misidentified, tell me what this means.

Ms. HENDERSON. Okay. Pete can probably talk more about proficiency testing because he does this in the laboratory.

Mr. MARONE. Sure.

Ms. HENDERSON. Go ahead, Pete.

Mr. MARONE. Proficiency testing is a quality assurance method, if you will, that is designed to test, ascertain the competency of the individual examiner. Each drug chemist every year, accredited laboratories must go through a proficiency testing program. For example, every drug chemist is given an unknown. They have to identify what it is. That could either be from an external source or an internal source but they don't know what the outcome is. And it is the same thing for trace evidence, for DNA folks. They will get a stain,

identify the stain, tell us what the profile is, is there semen present or whatever. And so what it literally is, it is a test of the competency of both the individual and the operating process within the laboratory. DNA requires two a year. Everybody else gets one a year in every discipline. Part of the proficiency testing process is to ascertain why you got the wrong answer, whatever that might be. In a lot of instances it is something minor that you can fix. If it is an instance where you find out the person really has issues, that individual is taken off of work until the problem is fixed, and at that same time you go back and look at other work that that person has done prior to that proficiency test to see if those issues are——

Chair WU. Actually I misunderstood you. When you were talking about proficiency testing and then said 50 percent of test results were incorrect, I thought the implication was that 50 percent of the results submitted as evidence were incorrect.

Ms. HENDERSON. No, this is looking at proficiency testing within the laboratory, not necessarily that they made it to the courtroom, if I wanted to—and again, it was in certain areas. Now, again, when they started in 1978 and looked at this and moved forward, we have put in place, I have to say in the forensic community, a lot more proficiency tests than were ever done before. We also have put into place of course ASCLAD/LAB [American Society of Crime Laboratory Directors—Laboratory Accreditation Board] accreditation, which then requires these proficiency tests. Before many laboratories did not have these requirements, and I know Peter Neufeld will probably chime in on this at some point. But that is one of the things that have been improved. I have to say, things have improved over the years, although I can say it is human nature. It is not perfect. I mean, these are human beings doing laboratory tests. But what they are trying to do—and that is why they have quality assurance groups that go out to the laboratories and identify if there are weaknesses perhaps in the system, and that is the other thing that they are trying to work through and that is something to encourage, I believe with more funding as well.

Chair WU. Here is an analogy from a different field. Ms. Henderson, what you are saying is that this is like having sanitary tests for restaurants and the restaurants fail 50 percent of the tests or inspections but that is not to say that 50 percent of the customers are necessarily eating unsanitary food?

Ms. HENDERSON. I don't know if I would say it that way. I have to say, with all due respect, I think that is putting words in my mouth. I don't think that is really—what I am saying is, in certain areas reflected in the work by Dr. Peterson, he found that over the years, and he looked at 20 or more years of proficiency tests, that in certain areas, I won't say all areas of forensic science, but in certain areas of forensic science people failed proficiency tests, right, and that was in—the hair and fiber was one of the most, I would say, telling areas of the proficiency test failures.

Chair WU. I am sorry, Ms. Henderson. You all are experts. That is why you are here. We are not. That is why we are here. And I am just trying to understand the policy implications of what you all are trying to tell us.

Ms. HENDERSON. Okay. I think Peter can address that.

Mr. NEUFELD. Mr. Wu, there is a fundamental disconnect, and the fundamental disconnect is that the reason you use proficiency tests is there is no way to know. When you are looking at a piece of crime scene evidence and you match it to me, did you get the right answer or the wrong answer, if you will, because you don't have a control. It is an unknown. And so proficiency tests are a substitute for that. Is that clear kind of? That is the fundamental difference. So for instance, when you——

Chair WU. That is clear. It is somewhat troubling but it is clear.

Mr. NEUFELD. Well, it is very troubling and so one of the things that you would want from a national——

Chair WU. Mr. Hicks does not agree.

Mr. NEUFELD. One of the things you would want from a National Institute of Forensic Science, for instance, would be to come up with a program of proficiency testing because there are four types of proficiency testing. There are external, there are internal, there are open, and there are blind. So a lot of the proficiency testing that is done, for instance, is the kind where the individual analyst knows it is a proficiency test and may or may not treat it the same way that he or she would actual casework. So what you would like to do ideally is to make the proficiency test more challenging and more robust and be able to sort of move it into the lab system so the proficiency test looks no different than an actual case. So you get the laboratory and the personnel to treat it the same way they would a regular case. It is expensive to do that. I think we all agree with that. But hopefully if you had this NIFS, okay, they could create national standards, they could create, if you will, a national proficiency test so the expense would not be on every laboratory and that kind of robust proficiency testing could happen more consistently throughout the country. The reason you want to do it—one of the problems we had, for instance, you know, in some of these other disciplines is you can assume that you have got the right person, but you don't have the same kind of scientific control that you have with the proficiency test to tell you for sure that you have the right person.

Mr. SMITH. Full circle. Back to the creation of a new agency perhaps. Do we not have enough of a grasp of where we need to go within the current agency framework, NIST or however we might proceed without creating yet another new agency that I think could end up being a bit of a distraction with the administrative parts of it rather than ramping up with current agency framework.

Ms. HENDERSON. I would like to go back to my immediate action first. I think let us take existing resources. And we do have—I want to mention, we do have ASCLAD/LAB, which is the American Society of Crime Laboratory Directors Laboratory Accreditation Board, which also has testing methods. NIST has testing methods in place already and I think then we do the interim action. So first let us start with what we have in existence. We don't throw out the baby with the bathwater, to use a hackneyed phrase here, but go ahead and say what do we have, and we have to corral the existing resources and I think Ms. Edwards, when she said let us see what is out there, we need to see what is existing in terms of funding, then let us see what federal resources we already have in terms of testing and things like that. Then we go to the interim action,

which would be to evaluate strategic policy decisions and strategies because we need to say what do we have here right now, and I think probably us in the forensic community would be able to probably pull all these things together and see what is out there. Then do the interim action. Then we go to the long-term action. I think it has to be a three-step plan. I think that is a much better way to exercise this particularly and looking at policy and strategies.

Mr. SMITH. Thank you.

Chair WU. Thank you, Mr. Smith.

I ask the forbearance of the witnesses in repeatedly asking these questions related to the role of science and forensics and why it makes a difference. I think this is a topic to which we will return at some future date. I just want to say in my own defense or admission of guilt that I have been asking why does nanotechnology matter for the last ten years because people don't seem to have good explanations about why it should be important just because it is small. And I have come to the conclusion that it is important and it is worth supporting. I have come to the conclusion that we are on to something here and that it deserves more focus, but I still quite frankly do not—I am still trying to understand the role that scientific rigor can play in being brought to bear on what has been an experiential field for the most part. Mr. Neufeld has provided some graphic examples based on DNA and I am trying to understand how it might affect the rest of what we do, whether it is conviction rates going up or going down, and our certainty about providing a sound service. I think that Mr. Smith has asked some good questions about what would happen in the organizational interim in trying to organize a new agency if that were the path we were to choose.

I want to focus on that a little bit, but first I start with Mr. Marone, and Mr. Marone, you said that resources are a real problem, but when asked specifically about how much more in resources, you begged off on the question, and I want to press you a little bit on that because it is easy to come here and say we need more, and we are in the line-drawing business about how much more, so if you are going to ask for more, I am going to have to ask you how much more.

Mr. MARONE. Well, I didn't beg off from the answer of what kind of resources, how much resources. I begged off the question as to how much it is going to cost, which are two different things, one could argue. But for example, if you want to look at resources——

Chair WU. We deal with dollar funding here, so if you could help us with that metric?

Mr. MARONE. Well, I can tell you things that it is going to take. For example, we need more people. How many people? We have to assess that and find out where we are. But where does that begin? We need a better entry source for our examiners. One of the things that we are looking at is the forensic science applicant pool. Who do we want them to be? Do we want them to be hard science or would we like them to be more science based and not requiring a baccalaureate degree as in many instances now with fingerprint examiners, firearms examiners and so forth. So we need to start at that level just like Dr. Downs needs to start with—if you need more people, you need to educate more people, you need to train

them for pathology. You know, there are reasons why people go into other fields. We have got to make it more meaningful to them, more palatable to them to go into the forensic science field, to go into public service. Forensic science has no scholarship program, for example, like in graduate school they get a free ride to go get a Ph.D. Okay. There is no such thing even at a Master's level in forensic science. We need that to get the qualified higher-caliber students interested in forensic science. That is going to——

Chair WU. Mr. Marone, what I think we need from you to make a case for this are the measurable inputs that you need. The factors that you are mentioning are all important policy concerns but ultimately I think, you know, we have to decide what are we going to put into this, what are the dollars and cents, what are the undergraduate or graduate programs, what are the certification programs, what are the standards that need to be developed, and I hate to be so pedestrian about this but I think that is what we need for action going forward. And I would like to ask you for help with that if we are going to take meaningful action in this field.

Mr. MARONE. I fully understand. That is one of the things that as a community we have to be able to provide to you is——

Chair WU. Yes, I am asking you to provide it, and if you are saying you can't provide it today, I am saying we need to have that before we can take meaningful action. At least I think we need to have that before we can responsibly take meaningful action.

Mr. MARONE. I defer to anybody else on the panel because I know among us we have hammered this thing around a lot and I don't know that we have come up with any definitive answer.

Dr. DOWNS. I may be able to give at least a partial answer regards medical examiners. Recommendation number 11 specifically referred to the medical examiner community replacing lay coroners with physicians, board-certified medical examiners.

Chair WU. And Dr. Downs, I wanted to ask you about that because in your written testimony you do make that recommendation, and if you look at the graduation rate for board-certified forensic pathologists, which is also in your written testimony, there is just no way that we can get to having the qualified pathologists that you want with the graduation rate that we have.

Dr. DOWNS. Agreed. It is staggering. We go through extensive training, as you know. Then we go into the subspecialty of forensic pathology, which I did in order to cut my salary in half. No one spoke to my wisdom in doing that, but the reality is, we go into forensic pathology for a different reason than perhaps other people go into medicine. It is a public service, and the number of people we need—we graduate 37 residents in forensic pathology a year, 37. We have 400 medical examiners actively practicing full time. We need an estimated 800. The cost per citizen, somewhere between $3 and $5 a head. So you can multiply that out. I get roughly $1 billion to $2 billion just to have an operating system. That doesn't get into the infrastructure of how many offices need to be replaced and quite honestly need to be up to code for CDC [Centers for Disease Control], safety and performance of an autopsy.

Chair WU. That is the medical examiner side of things, the medical examiner/coroner side of things?

Dr. DOWNS. Right, and if we actually were to do away with the 1,000-year-old office of the coroner, there are 3,000 counties out there and a fair number of them are served by coroners, and I would imagine that the counties would have something to say about that issue. In some places——

Chair WU. Well, Dr. Downs, when an institution has survived for 1,000 years, there is usually a reason, and the paperless office has been predicted for a long time but papyrus has been with us a long time. There is a lot of paper up here.

Dr. DOWNS. Yes, sir.

Chair WU. So I think I get the drift of where you want to go and we ought to push in that direction but implementing from here to there is the challenge.

Dr. DOWNS. If we could enhance the investigation, the abilities of the coroner to do their job, I think that is a good place to start. We aren't going to get rid of the office of the coroner anytime soon, as you pointed out, sir, and I think if we can professionalize the office, we are way ahead of the game.

Chair WU. Ms. Henderson, you make recommendations about substantially increasing research. Do we have the infrastructure in place to do the amount of research that you are recommending?

Ms. HENDERSON. Well, we do have in many universities now, because, of course, forensic science has increased attention so there are different programs that are out there that have Ph.D. students but we can also go to other institutions. I think there is—and again, if we want to look at hard science, and that is one of the areas to go to, let us go to biology departments, we will go to chemistry, because all of these things can be worked, not just in a forensic science program, but also in hard science programs. So I think, particularly if there is money to do research—I know this because I live on grant money myself—that people will then come and do the research, again working, I think, in conjunction with existing laboratories to know what are the needs or with the medical examiner's offices.

Chair WU. What I am hearing is a mixed answer. There are existing laboratories, State laboratories, private laboratories, federal laboratories. There is a university research base and——

Ms. HENDERSON. And they are not always talking to each other. That is one of the problems.

Chair WU. And what I don't hear you saying is that the capacity is there. I don't hear you saying the capacity isn't there.

Ms. HENDERSON. Well, of course, I know that—I think the capacity is there. Of course, people will say we need to have the dollars to fund it and then I will have to get back to you with how much money we would need to fund those types of research programs. As I told you, when I was president of the academy, one of the things we saw was, there was a lack of research dollars within the Forensic Sciences Foundation, which is a group that actually spun off, if I can say it that way, from the American Academy of Forensic Sciences. So now what we are doing is, with this $300,000 plus, we are giving stipends basically to graduate students in these accredited forensic science programs so that they can do research and they can go present the research in peer-review settings. So there

has been a movement in that particular area. So I think we are making many efforts in that particular area.

Chair WU. Would it be constructive to have departments of forensic science or a new organization at the federal level to handle forensic science when this is a very important applied field but it brings together so many, if you will, different stovepipe sections of science, whether it is metallurgy, whether it is mechanics, whether it is biology, organic chemistry or DNA and biochemistry. Would this be a meaningful add to try to create this field, if you will?

Ms. HENDERSON. Well, we actually have—I have to say, and this is where I receive some of my grant money from is the National Institute of Justice. They have a science and technology section that, you know, gives grants to people to do research. The Bureau of Justice Assistance also has money. So there are existing institutions that do provide money for people to do significant research, and of course NIST has been doing research over the years as well. In fact, they testified before the National Academy of Sciences group, so I think that—I don't know that creating another entity is always a good idea. I don't know whether there could be better coordination between entities. That perhaps might work. And I don't know if you, you know, can actually twist enough arms from federal agencies in order to all work together as a collaborative venture.

Chair WU. Well, it seems to me that this is a field that is tailor-made for our research university structure where there are disciplines from across many different fields and you really need to tap and access those fields in order to do good work.

Ms. HENDERSON. I would not disagree with that.

Chair WU. Mr. Neufeld.

Mr. NEUFELD. I would just, you know, echo the words of recommendation number three of the NAS report which calls for the creation of a competitively funded peer-reviewed research program that would be at this National Institute of Forensic Science. They point out through the two years of hearings they had that there was a terrible paucity of federal funds available for meaningful research in the forensic sciences, and certainly what you would want to have is some coordinator, or quarterback, who could decide what the priorities are, and even if there are pools of money at DOD or Homeland Security or other places, at least the quarterback could decide maybe we can tap into some of those other pools of money but at least there will be strategic decisions made by somebody, and there are no strategic decisions being made now by anybody. When the NAS had their hearings, somebody testified in fact from NIJ, who was in charge of their science and technology program there and felt that NIJ was a poor place for locating this research undertaking because of their own internal perceived conflicts of interest as representing the different law enforcement agencies that NIJ currently represents. Moreover, there is a historical problem at NIJ of almost all their research money being earmarked, terribly earmarked for not just a discipline but earmarked that it would take place at a particular institution, which is the antithesis of the way that the National Science Foundation works. It is the antithesis of the way the National Institute of Health works. One of the things that the reports recommends, for instance, is the NIH

should have a research budget to help forensic pathology so to help people who are medical examiners get research done in the areas that are breaking into new territory. They don't even have that, okay. But if there is a quarterback somewhere who is going to be looking out for the interests of all these people in the forensic community, then they can push the NIH to get some of that money. Then they can push Defense or other agencies that have pools of money to bring it to bear where it is needed.

Chair WU. Well, Ms. Henderson, thank you for sharing your perspective on Australia, that it has taken them 20 years of work on this. I expect that as we go down this road, it will not be a short one no matter what path we choose to take.

Last pass. Mr. Hicks, you seem to have a different opinion about whether a new independent agency or quarterback or anything else is needed and I wanted to give you and anybody else who wants to take the other side a moment to more fully explore whether to do that or not. What do you see as the downside of proceeding down that path?

Mr. HICKS. I think just from the practical aspects of implementation, and you have already articulated, I think, a lot of the concerns about trying to establish that large an agency. And even in conducting research, I think it is important that this be community driven so that someone in an academic setting who is not familiar with the ongoing operations of a laboratory and the kinds of questions that they need to address, there needs to be some connection there so that they have a sense of directing research that is applicable to the questions to be answered. And as has already been mentioned, again, there have been other federal initiatives here to try to support problems and needs in the forensic community such as backlog DNA testing and overall quality laboratory improvement. These may be vehicles that can continue to be brought to bear to help improve laboratory services. It seems to me where the big gap is, as I have said repeatedly here, is that in looking at some of those currently practiced forensic techniques as to whether or not they meet the scientific rigor and scrutiny that will help to assure confidence in the courts and that is where again I think you could direct activity instead of sort of open-ended research but you could direct activity into looking specifically at some of those areas, and it is a question of where does the competency lie to try to address that right now. Do you have to build a new organization to do that or are there competencies now that might be brought to bear on that question.

Chair WU. Does any advocate for a new organization want to take a minute to address that? You all are good? Okay. Very good. Thank you all very much for being here today. The record will remain open for additional statements and for questions and answers on the record that Members of the Committee may ask of each of the witnesses. I want to thank you all for beginning this path at this committee level to explore what we can do to improve the state of forensic science in America and look forward to working with you all going forward.

Thank you very much, and the hearing is adjourned.

[Whereupon, at 12:17 p.m., the Subcommittee was adjourned.]

# Appendix 1:

## Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

*Responses by Peter M. Marone, Director, Virginia Department of Forensic Science*

**Questions submitted by Chair David Wu**

*Q1. The NAS recommends that the Federal Government oversee education standards and accreditation of forensic science programs in colleges and universities. What is your opinion of this recommendation?*

*A1.* One of the main points discussed throughout the report is standardization. The Committee's recommendation was not to replace the existing accrediting body with a totally newly developed federal program, but to utilize the existing, already working program which can be reviewed to assure that it meets the needs. Then support this program and the institutions applying to it for accreditation. The example for accreditation of forensic science educational programs would be the Forensic Education Program Accreditation Commission (FEPAC), which is a standing committee of the American Academy of Forensic Sciences. While this Commission has been in existence for just five years, it has shown significant success in raising the scientific rigor of the programs which it has already accredited. There is a quantum difference between overseeing the accrediting body and creating a new body from the ground up. A benefit of the standardization of these requirements is that students and these accredited universities could receive the benefit of federal support in the nature of scholarships or loans for tuition (forgivable at a rate of say, 20 percent for each year of service in a publicly funded crime laboratory).

For the existing undergraduate FEPAC accredited universities there are approximately 1,600 students. If the average cost for each student is $25,000 per year, the cost to fully fund undergraduate education for the existing forensic programs would be approximately $40,000,000.

For the existing FEPAC accredited graduate level programs, there are approximately 175 students. If the average cost of graduate study is $30,000 per year for each student, the cost to fully fund graduate education for the existing forensic programs is approximately $5,250,000.

*Q2. What is the level of funds the Federal Government currently allocates to forensic science research? What will the transitional issues be in changing from a mostly experienced-based system to a rigorous scientific-based system?*

*A2.* As noted in the report, in Chapter 2, pages 14 & 15, NIJ funding for the forensic sciences in 2007 was a total of $6,590,702, of which $4,048,563 was directed to DNA related research and only $2,542,139 was directed to crime scene tools, techniques and technologies; Impression Evidence; Facial Recognition; Iris Recognition; and Automatic Fingerprint Matching. The Federal Bureau of Investigation has about $33 million allocated for research purposes. Currently, I have no idea as to the amount of forensic research funding from the Department of Defense, Department of State or other agencies. However, it must be noted that other agencies are not developing forensic technology intended for State and local use. It could, however, be commercialized but it is critical that Congress recognize that even if a R&D program for technology was increased, the forensic community would not have the funding to purchase the new equipment or to maintain it if they were able to purchase it. Further, these programs are focused on the advancement of existing technologies not on validation.

Transitional issues should be considered first, research to validate the underlying principles of the disciplines at issue, namely friction ridge determination, firearms and toolmark analyses, and questioned document analyses. In addition to this would be determination as to the application of statistical models that would allow for the assessment of a statistical significance of the particular comparison.

*Q3. What federal resources would be required to establish a National Institute of Forensic Science?*

*A3.* I don't believe that I am qualified to give a number for this as I do not work in the Federal Government. However, if one were created or if the existing structure was expanded, then funding would be necessary for staffing of the entity. In addition, there would be needed travel funds for numerous technical advisors necessary to review, comment on and aid in implementation. They would then require a budget of great significance to support the operational needs of the State and local forensic community which I believe must be assessed through annual requirements analysis of that community.

**Questions submitted by Representative Adrian Smith**

**Cost**

*Q1. What would the recommendations in the NAS report cost? Specifically, how much funding do you think is required for the proposed forensics institute? How much is necessary to fulfill the other technical recommendations, such as basic research, validation, and standards for accreditation and certification?*

*You also state in your testimony that federal funding for disciplines outside of DNA "falls far short of what is necessary." Could you provide an estimate of how much* is *necessary—even a ballpark figure for us as we move forward?*

*A1.* I do not believe I can provide to you a total cost to do this as I am not a federal employee so I am unsure of what it costs to run a federal agency. I have, however, put together the numbers I believe to be rough for accreditation which I have listed below. **It is important to realize that this does not include daily operations of labs, such as additional personnel (which have been estimated by some to be as many as 10,000 examiner positions), nor the equipment needed not only to support the new individuals, but also to replace and upgrade the equipment existing in laboratories now, nor the additional laboratory space for the additional personnel.**

**Accreditation NOTE: These numbers do not include any estimates for the inclusion of Coroner or Medical Examiner offices.**

From very *preliminary* surveys and numbers drawn from the number of police departments and sheriff offices, it is estimated that there may be 11,000 entities that fit into the category of forensic service providers.

To train one individual in each agency to prepare for accreditation is approximately $5,000 each or a total of **$55,000,000.**

It requires approximately two years of time for that trained individual to bring the agency into compliance to achieve accreditation. The cost of two years (times 11,000 agencies) for this process is estimated at **$900,000,000.**

Cost of upgrading of facilities to meet safety, security, etc., cannot be estimated since these issues are variable.

The average cost of an accreditation site visit is approximately $10,000 per visit, totaling **$110,000,000.**

The accreditation cycle is five years. The average cost of an annual surveillance visit is $1,000 per site, so the total cost for a five-year cycle would be approximately **$11,200,000** for the surveillance visits.

Currently, administrative cost of the program is approximately $150.00 per (what would be a certified individual). If each agency has an average of 10 individuals working as forensic service providers, (that's 110,000), the total is 16,500,000 per year or **$82,500,000** for a five-year cycle.

**Certification NOTE: These numbers do not include any estimates for the inclusion of Coroner or Medical Examiner offices.**

The cost of certification fees, travel to testing site, study materials, etc. is approximately $1,000 per individual (times the 110,000 estimated above), for a total of **$110,000,000.** The ongoing fees and annual fees will be less than this figure for the succeeding four years, maybe $75,000,000 each year.

**NIST Capabilities**

*Q2. Assume for a moment that Congress opts not to create a new forensics institute but still follows through on the technical recommendations in the NAS report. Which among those should be carried out by NIST versus other agencies or private sector organizations? (May want to ask for more detailed answers in writing.)*

*To put this question another way, if no new agency is created, is NIST capable of, and should they: a) Establish* best practices *for scientists and laboratories? b) Establish* standards for accreditation *of forensic labs and certification of forensic scientists? c) Develop* standard operating procedures *for forensic labs? d) Oversee* education standards *and* accreditation of university forensic programs*?*

*A2.* Once again, the intent of the report was not to establish new provisions from scratch, but to work from existing programs. NIST can aid in standardizing of the protocols and best practices recommended (but not mandatory) as outlined by the various Scientific Working Groups. I have already answered b., c., and d. above.

**Crime Lab Accreditation**

*Q3. You note in your testimony that great progress has been made with respect to accreditation of public crime laboratories—in 2005 over 82 percent of labs were accredited. How do you think existing accreditation mechanisms should be dealt with in light of your recommendations for the Federal Government to develop its own accreditation standards? How might government intervention impact private sector organizations' incentives to continue its accreditation work?*

*A3.* Actually, the report is quite clear. Just as in the accreditation of academic forensic science programs, the committee specifically stated that the existing accreditation programs not be "reinvented" by the Federal Government. What we intended was for the federal entity to review and assess whether an accrediting body (for testing laboratories) met the international standards of ISO/IEC 17025 and therefore would be able to conduct the assessments of compliance to those standards. During that process, an accrediting body may have to adjust their requirements to meet the ISO/IEC 17025 specifications. This action is to assure that all accreditations would meet the standards required and therefore comply with federal requirements for funding.

> "On Friday, September 12, 2008 at an annual meeting of the General Assembly of the InterAmerican Accreditation Cooperation (IAAC), held in Paraguay, ASCLD/LAB was formally accepted as a signatory to the IAAC Multi-lateral Recognition Arrangement. This action means that ASCLD/LAB, and specifically the ASCLD/LAB–International accreditation program for testing laboratories, is now internationally recognized and accepted as operating in conformance with ISO and IAAC standards and practices. ASCLD/LAB is the first Forensic Science Accrediting Body in the United States to achieve this recognition."

Upon acceptance by the federal entity, the ASCLD/LAB International Accreditation Program would continue to conduct accreditations, meeting the intent of the committee report. This would be true of any accrediting body which meets or would meet the requirements and is approved.

**Prioritization of NAS Recommendations**

*Q4. Among the technical recommendations in the NAS report, what one or two stand out to you as the highest priority, and why?*

*A4.* I believe that this is not a circumstance where A needs to be completed before proceeding to B or C. Several of the recommendations can be implemented concurrently. Certainly the research needed to validate the underlying principles for latent print comparison, firearms and toolmark examinations, and questioned document analysis needs to begin (**Recommendation 3**), as well as the research into the effects of observer bias (**Recommendation 5**). This will take some time. At the same time, the preparation for implementing and requiring accreditation forensic service providers (labs, fingerprint comparison units, crime scene, and digital evidence sections) and certification of individuals can begin. This also will be a multi-year process for educating the applicable parties, aiding in the preparation, application, and final accreditation and/or certification. (**Recommendations 2, 6, 7, and 8**).

**Prioritization of Research Needs**

*Q5. Has the forensic science community attempted to prioritize research needs across various disciplines? If not, in your opinion what areas of research are likely to contribute the greatest benefits to the legal system through increased funding?*

*A5.* See answer to number 4 above concerning research. While some research has been conducted along these lines, there has been no nationally coordinated process to assure that the needs of the community have been addressed.

ANSWERS TO POST-HEARING QUESTIONS

*Responses by Carol E. Henderson, Director, National Clearinghouse for Science, Technology and the Law; Professor of Law, Stetson University College of Law; Past President, The American Academy of Forensic Sciences*

The questions posed by the Committee are thoughtful and relevant. However, most cannot be answered accurately at this time because of a lack of data.

For example: there is no data on how many of the Nation's approximately 17,000 law enforcement agencies are conducting pattern analysis investigations such as fingerprint and tool mark comparisons and no line for "Forensic Science Research" in the budget of federal agencies.

Without a solid platform of information it is not possible to answer questions such as the cost of establishing a NIFS, the cost of implementing a national research agenda and conducting the associated research, or even the cost of moving pattern evidence from experiential to science-based. The same applies to the recommendation on transitioning control of forensic services from police to non-law enforcement control.

While I have tried to give the Committee the best answers to their questions, I strongly caution—as I did consistently in my written and oral testimony—that significant research is required to provide adequate data on which to base supportable cases regarding implementation of most of the NAS recommendations.

Although much of the focus in this response has been on federal agencies, the majority of cases are processed by State and Local agencies.

A thoughtful, well-researched strategic plan to propel the forensic science community forward so that we all serve the justice system in the manner in which it deserves is required.

The first step should be to require an independent study of the funding and resource implications of the report recommendations, and to produce a strategic plan for their implementation.

I know that the National Clearinghouse for Science Technology and the Law, which I direct, has the capability and experience in bringing together expert groups to be able to deliver such a plan in a timely fashion.

**Questions submitted by Chair David Wu**

*Q1. The Academy of Forensic Sciences (AAFS) has created an Education Committee and Accreditation Board to review the quality of forensic science education programs and current accreditation and certification programs. What have been your findings?*

*A1.* The AAFS established a Forensic Science Education Programs Commission (FEPAC) in 2004 to review education programs.

FEPAC accredits forensic science education programs that lead to a Bachelor's or Master's degree in forensic science or in a natural science with a forensic science concentration. All programs that FEPAC accredits are located within institutions that are accredited by a regional accreditation organization.

The review function of FEPAC is to assess programs against standards, and either grant or not grant recognition. There are currently 25 programs that have applied for and received FEPAC accreditation. The AAFS has estimated that there are 148 forensic science programs offered by colleges or universities in the United States.

*Q2a. What is the level of funds the Federal Government currently allocates to forensic science research?*

*A2a.* There has been no study of all the funding resources covering all federal agencies. However, the following describes the situation as best as can be determined.

The only on-going source of general research funding in the scientific aspects of forensic science is the National Institute of Forensic Science (NIJ).

Funds for DNA research were $9.227M in 2008 (*http://www.dna.gov/funding/research-development/*). Information about funding for non-DNA research is not readily available as they are allocated on a year-to-year basis depending on the level of funds available, including Congressionally-directed funds.

Not all of the available discretionary funding is allocated to forensic science research.

There is a National Academy Panel working on the topic of NIJ research funding, with an expected reporting date of early 2010 (see *http://www8.nationalacademies.org/cp/projectview.aspx?key=48868,* Project Title "Assess-

ing the Research Program of the National Institute of Justice"; Project scope includes "1) What is the role of NIJ in supporting and sustaining the Nation's scientific infrastructure of crime and criminal justice research . . .."

In general, only eight percent of requests to NIJ are supported. Other agencies such as the FBI, BATF, DHS and DOD fund forensic research on an ad hoc basis.

*Q2b. What will the transitional issues be in changing from a mostly experienced-based system to a rigorous scientific-based system?*

*A2b.* This question is impossible to answer without extensive research, as I described in my testimony to the House Subcommittee.

It is not known how many of the 17,000 or so law enforcement agencies in the U.S. conduct some sort of forensic science testing, such as latent print or firearms examinations.

Issues include: personnel qualifications; training and education, grandfathering or waivers for non-science practitioners who can demonstrate competency (which in turn begs the question of whether there is a need to transition); national quality assurance standards; and the rights of states to implement their own standards independent of federal mandates.

*Q3. What federal resources would be required to establish a National Institute of Forensic Science?*

*A3.* Australia has a national institute of forensic science with a mandate similar to that proposed for NIFS in the NAS report.

The current fiscal year budget for NIFS Australia is $1.233M Australian (*http://www.anzpaa.org/pubs/ANZPAA%20Business%20Plan%202008-2009.pdf*) which is approximately $13.5M U.S. allowing for population and currency exchange rates.

**Questions submitted by Representative Adrian Smith**

**Prioritization of NAS Recommendations**

*Q1. Among the technical recommendations in the NAS report, what one or two stand out to you as the highest priority, and why?*

*A1. There is no national prioritization of forensic science research needs, identification of gaps and opportunities in anything other than in short-term, ad hoc or narrowly focused ways.*

Without a valid research program and strategy forensic science cannot develop the sound knowledge base needed for training, education, and service delivery that is needed to serve the justice system.

**Prioritization of Research Needs**

*Q2. Has the forensic science community attempted to prioritize research needs across various disciplines? If not, in your opinion what areas of research are likely to contribute the greatest benefits to the legal system through increased funding?*

*A2.* Many forensic tests-such as those used to identify the source of tool marks or bite marks—need to have additional, rigorous, scientific research to prove their validity and reliability.

Proper and rigorous scientific studies must be performed and published, which are tightly coupled to legal requirements that focus on accuracy, validity and reliability, including the human component (understanding human performance, bias, and human error).

Sources of error and limitations of each discipline and associated methods have to be identified.

ANSWERS TO POST-HEARING QUESTIONS

*Responses by John W. Hicks, Director, Office of Forensic Services, New York State Division of Criminal Justice Services (Ret.); Former Director, FBI Laboratory*

**Questions submitted by Chair David Wu**

*Q1. What is the level of funds the Federal Government currently allocates to forensic science research? What will the transitional issues be in changing from a mostly experience-based system to a rigorous scientific-based system?*

*A1.* With regard to current funding levels for forensic science research, it is respectfully suggested that the federal budget may be the most accurate and reliable source for this information. Traditionally, the National Institute of Justice is recognized as the primary agency supporting forensic science research by academic institutions and other practitioners. In addition, research funding is typically supported for agencies which operate forensic laboratories such as the Federal Bureau of Investigation; the Drug Enforcement Administration; the Bureau of Alcohol, Tobacco, Firearms and Explosives; the United States Secret Service; the U.S. Postal Inspection Service; and Department of Defense agencies. Research funds usable for these purposes may also be available within and through the National Institute of Standards and Technology.

With regard to your "transition" question above, I think it is important to recognize that a sound scientific basis already exists for much of the work performed by federal, State, and local forensic laboratories—especially work performed under the discipline headings of forensic DNA analysis, forensic analysis of controlled substances, and forensic toxicology. In addition, work performed in other disciplines to determine the chemical composition of materials recovered from a crime scene such as explosives, paints, and polymers is carried out using proven and well-established scientifically-based analytical methods. Many of these laboratories are accredited by the American Society of Crime Laboratory Directors/ Laboratory Accreditation Board (ASCLD/LAB) under their "Legacy" or "International" programs of accreditation. Under these programs, the laboratories must demonstrate that test methods in use are fully documented and validated in order to maintain their accreditation status.

As indicated in the recent report of the National Academy of Sciences, there appears to be a need for independent review of methodologies employed in the "experience-based" forensic disciplines which rely in large part on pattern recognition and comparison techniques such as those employed in the examination of fingerprints; firearms and fired ammunition components; toolmarks; impression evidence; hand writing; and crime-scene reconstruction. As indicated in my testimony before the Subcommittee, I believe that data may exist that could be subjected to further studies to bolster the scientific underpinnings of the work being performed and provide greater assurance for the courts in considering forensic evidence. In some areas, it may be necessary to gather additional data for specific studies to address questions that have arisen.

In my view, the most efficient, effective, and economical way to accomplish the "transitions" where such a need is indicated is through a coordinated effort by agencies already engaged in forensic science research under the general guidance of a national advisory board comprised of forensic science practitioners, research scientists and academicians. Established Scientific Working Groups for the various forensic disciplines would be engaged in this effort subject to the general guidance of the national advisory board. The National Institute of Standards and Technology has already demonstrated its core competencies for this effort and should be given a primary role in carrying out assessments of current methodologies and their supporting data and in conducting detailed and rigorous scientific studies where a need is indicated to further validate forensic methods. This process should be sufficiently transparent to assure the courts of the general acceptance and scientific validity of forensic techniques. It would be important to provide expanded resources to support the development and delivery of specialized training programs not only for forensic laboratory personnel but also for the "client" groups that receive their work product such as investigators, prosecutors, defense attorneys and judges. As indicated in my testimony before the Subcommittee, the forensic DNA experience provides a helpful and proven model in this regard.

*Q2. What federal resources would be required to establish a National Institute of Forensic Science?*

*A2.* I do not support the call for the creation of a National Institute of Forensic Science. In my view, a separate federal agency would be unnecessarily duplicative of well-established expertise, forensic services, and resources now in existence in several federal agencies.

I also do not believe it is politically feasible or practical to incorporate all activities that might be characterized as "forensic" under a single entity as has been proposed. For example, death-investigation services as provided by Medical Examiners and Coroners are typically and with rare exception conducted independent of and apart from forensic laboratory operations as are other specialty services such as "forensic" odontology (bite mark evidence), and Fire Marshall activities in determining the cause and origin of a suspicious fire. In addition, it is not clear that non-governmental forensic practitioners (so-called private experts) who provide services in civil matters or for criminal defense purposes would be included under the scope and authority of a National Forensic Science Institute as proposed.

**Questions submitted by Representative Adrian Smith**

**Prioritization of NAS Recommendations**

*Q1. Among the technical recommendations in the NAS report, what one or two stand out to you as the highest priority, and why?*

*A1.* In my opinion, elements found in NAS recommendations #1, #3 and #10 should be given the highest priority.

As set forth under their recommendations #1 and #3, funding should be directed at promoting scholarly, competitive peer-reviewed research which addresses issues of accuracy, reliability, and validity in forensic science disciplines. Funds should also be directed at assessing the development and introduction of new technologies in forensic investigations, especially technologies that improve the detection and discrimination potential for materials typically encountered at crime scenes and automation technologies which can be applied to reduce evidence processing times.

Under the NAS recommendation #10, funding should be made available for distribution to educational institutions and other appropriate organizations to encourage the development and improvement of graduate education programs in the forensic sciences. Funding should also support continuing education programs for lawyers, judges, law enforcement personnel, practitioners and other groups that are involved in the collection of physical evidence or groups that utilize the results of forensic analyses within the criminal justice system. Such groups might include those involved in the medical treatment of victims of crimes.

**Prioritization of Research Needs**

*Q2. Has the forensic science community attempted to prioritize research needs across various disciplines? If not, in your opinion what areas of research are likely to contribute the greatest benefits to the legal system through increased funding?*

*A2.* I believe that steps have been taken within individual forensic disciplines to identify research and developmental needs. Typically these have been articulated through the various Scientific Working Groups. As expressed in my written statement, I believe a national advisory board comprised of representatives from the criminal justice and crime laboratory communities, working with relevant professional organizations, accrediting bodies and individual discipline scientific working groups, would provide the best perspective for assessing and assigning these priorities. This activity would be supported by a closely coordinated effort among key federal agencies to include the National Institute of Standards and Technology, the National Institute of Justice and the Federal Bureau of Investigation.

ANSWERS TO POST-HEARING QUESTIONS

*Responses by James C. Upshaw Downs, Forensic Pathologist/Consultant, Coastal Regional Medical Examiner, Georgia Bureau of Investigation*

**Questions submitted by Chair David Wu**

*Q1. What do you feel have been the institutional impediments that have prevented a national vision for the forensic sciences? What about our current infrastructure proves resistant to change?*

*A1.* Impediments to change in forensics exist on multiple levels.

Inertia
Lumping (one size-fits all solutions)
Accreditation& certification
Resources/facilities
Massive unfunded mandate
Personnel
Training/continuing education
Caseload
Adversarial jurisprudence
Lack of sufficient information acquisition and transfer

First and most pervasive is inertia. A national resignation to the status quo is defended with typical "easy" answers: insufficient resources, lack of jurisdiction, lack of incentive, overwhelming case loads, etc. The truth is that there is no "system" to change. The present U.S. local, county, State, and federal jurisdictions have different strategies for accomplishing the scientific analysis of evidence and the presentation of same into the courts. Even as far reaching a change as the Daubert decision by the Supreme Court of the United States is not a national evidentiary standard. It does provide guidelines to courts under the federal umbrella but is not directly applicable across the board. Thus the legal precedent arguably insisting that quality forensic work is a federal responsibility and essential for justice is little more than a footnote in many areas. "Injustice anywhere is a threat to justice everywhere."[1]

The reality is that, as was pointed out by the NRC report, the forensic sciences have no champion to provide that vision for change or a unified drive to implement and follow through on what is sure to be a slow and trying process of updating. The NRC Committee recognized a compelling to do things differently if we truly wanted substantive change. Having carefully considered the issue over the course of years and benefiting from numerous presentations by practitioners in numerous sub disciplines, the diverse NRC Committee made this challenge their first priority. The response to this, their paramount recommendation, will determine just how ingrained the mindset of inertia is. Merely complaining that change is needed does nothing to effect such change.

The need for a high-level champion for the needs of forensics is obvious. The question then becomes where such best to locate the oversight. Again, the committee specifically considered numerous possibilities but these experts best advice was to start anew.[2] Failing that, it would seem most logical that since we are talking about the application of science to justice, the existing natural fit would be within justice.

All the revisions in existing practice would have to take place concurrently with continued case throughput. In many areas, crushing backlogs in evidence analysis are albatrosses around a lab's neck. Leadership to instill confidence in the personnel involved and in the user agencies must occur in advance of and continue simultaneously with implementation in order to achieve maximal success.

Although in practice the crime lab and Medical Examiner/Coroner worlds intersect routinely, they are not by any stretch the same. As a former State crime lab director, I fell qualified to address certain large picture issues in that arena but would defer to a more experienced active crime laboratorian in discussion of details and certain other issues. In the area of death investigation, the recognition of the important difference between the office of the Medical Examiner and that of the Coroner must be kept in mind. Of course, there is no national death investigation system at all. Every one of the 50 states and all ~3,000 counties operate differently—sometimes dramatically so. Roughly half of the U.S. population is served

[1] Dr. Martin Luther King, *Letter from Birmingham Jail.*
[2] *Strengthening Forensic Science in the United States: A Path Forward.* National Academies Press. 2009.

by a forensic pathologist-based (read scientifically founded) investigation and half by an elected coroner-based (read little to no training or background required) operation. If we are to truly reform the medical practice of death investigation, it is essential to not only recognize the inequity inherent in such a structure but to take the step of doing something about it.

A brief digression into the history of the Anglo-based office of Coroner may help to give perspective. References to a Coroner, charged with death investigation, can be found as early as tenth century England. In the twelfth century, the office was reinvented in order to balance the national debt, owing to the ransoming of Richard the Lionhearted from Austria. The office was staffed by a nobleman of means in order to ensure that the then-corrupted office of Sheriff (viz. Sheriff of Nottingham) was kept at bay. The office then remained largely unchanged over the ensuing centuries until immigrating to the colonies. In the worst present-day cases, the office of Coroner is elected and requires no requisite training in death investigation at all. The myth of a general physician or other medical personnel somehow being better qualified seems to derive from the belief that since most deaths are natural and since a general physician knows about natural disease, they can triage the cases with the remainder being referred to a more skilled Forensic Pathologist. The inherent flaw here is that it assumes that persons with natural disease have died a natural death—the Pygmalion effect in the extreme. Stagnation is comfortable. Since the office of Coroner is generally elected and since "all politics is local"[3] it may well continue prove to be difficult to eliminate an office that has existed for over a millennium. In order to ensure public health, national security, and justice roles, a national death investigation system should be created to ensure all similar cases are treated the same, regardless of jurisdiction. This can only happen with a dramatic change in the status quo and with a, heretofore abdicated, federal interest in the process. With a strategic plan to correct extant jurisdictional iniquities, the office of the Coroner can be absorbed into a professional medicolegal death investigation system wherein the local (city, county, region, or State—depending on population and needs) director is a board-certified Forensic Pathologist. The Coroner would become a skilled paraprofessional tasked with referral of appropriate cases for evaluation by the specialist.

All of the changes called for by the study are going to require significant funds to accomplish the goals spelled out. Unfortunately, especially in the present economy, such a massive unfunded mandate calling on locals to eliminate a system largely recognized to be working will be a tough sell. The NIFS would be an important component in getting nationwide compliance.

Another impediment is the seeming metastasis of the courtroom's adversarial system into the forensics laboratory. While there have clearly been some high visibility failures, the fact that we have recognized and corrected issues in the past speaks to the fundamental fairness and confidence we should have in practitioners. Just as other non-forensic sciences have weathered the storms of unethical practitioners and faked research, so has the forensics world. Regardless of specialty, practitioners should have no agenda in conducting their analyses other than finding immutable scientific facts. As a practical matter it makes sense to assign forensic laboratories to work closely with justice-related agencies. The reality is that the unquestioned biggest user of forensic services is law enforcement. Although unheralded by some, these results are oft used to exclude individuals and to avoid prosecutions. Some argue an inherent bias in such a relationship but as the NRC committee clearly recommended (is carefully edited out of the commentary by many) is that forensic labs should be operationally autonomous[4] from law enforcement agencies. This does not mean removed from same. In point of fact, too great an independence can bring its own very real problems. Despite media popularity, television ratings have never really equated with budget numbers. Especially in trying economic times, a free agent crime lab or Medical Examiner/Coroner may find it difficult to compete for funding.

An important and little recognized issue is the marked differences between crime laboratories and Medical Examiner/Coroner operations. Further, within the latter, the differences between Medical Examiners and coroners range from vast to none—in short, there is no one-size-fits all answer, off-the-shelf answer. Were there, the NRC committee would have called for same. Instead, the loud and clear message of the panel was "we need change, we need it now, it will be expensive, and we need guidance."

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[3] U.S. Rep. Tip O'Neil by *http://www.riverdeep.net/current/2000/10/103000_politic.jhtml*

[4] *Strengthening Forensic Science in the United States: A Path Forward.* National Academies Press. 2009.

Accreditation and certification should go a long way to ensuring requisite neutrality and checks and balances. Practitioners of a craft are in a much better position to address the particular scientific expectations and needs of a specific discipline—one would not want a Forensic Pathologist (unless, perhaps one uniquely skilled in that discipline) advising a trace evidence analyst how to conduct an assay any more than one would think the reverse a good plan. As such, lab accreditation should be spearheaded by groups such as the American Society of Crime Laboratory Directors—Laboratory Accreditation Board to expand.

We are creating an artificial distinction in the forensic sciences in the over-emphasis of the forensic component and not enough on the science. In short, science is science. A theory is developed, experiments conducted, results obtained, and an interpretation is made. The difference is that in the forensic world, the test results and opinions related thereto are often used in court proceedings (although oftentimes they are used to avoid taking a matter to trial). Skeptics argue that this raises the bar on these test results because in the courtroom, someone's life, liberty, and/or livelihood are at stake. What they fail to mention is that this is no different from scientific endeavors in other fora. A medical test may determine if medication is given and if that medicine will save or take a life. An incorrect engineering test can result in catastrophic design failure and untold loss of life.

Fundamentally, if we are to trust a laboratorian, we have to bestow that trust. The qualifications and ethics of the practitioner must be assured in advance. For example, in the medical model, clinical pathology labs are expected to receive national accreditation—usually a prerequisite for reimbursement. The *Clinical Laboratory Improvement Act* (CLIA) some two decades ago sought to assure the public of such baseline confidences:[5]

> *The Centers for Medicare & Medicaid Services (CMS) regulates all laboratory testing (except research) performed on humans in the U.S. through the Clinical Laboratory Improvement Amendments (CLIA). In total, CLIA covers approximately 200,000 laboratory entities. The Division of Laboratory Services, within the Survey and Certification Group, under the Center for Medicaid and State Operations (CMSO) has the responsibility for implementing the CLIA Program.*

The objective of the CLIA program is to ensure quality laboratory testing. Practitioners are expected to achieve individual certification in their respective disciplines—again an important assurance of laboratory excellence.

The lab accreditation model, although not universal, is well-accepted in the crime lab world, with upwards of 80 percent of publicly funded crime labs accredited.[6] In the Medical Examiner world, there has been significantly less achievement of this benchmark, with only ~60 accredited sites.[7] Coroner operations vary so dramatically across the country that only a handful has achieved.[8]

Again to the medical model—in many areas, the Medical Examiner's office falls under a medical university. Such hospitals are tertiary care and training centers, seeing the most complicated patients while training tomorrow's physicians how to treat them. Regrettably, in many cases, the outcome not surprisingly is bad. In such cases falling under Medical Examiner jurisdiction (a fairly sizable percentage), the medicolegal autopsy examination is conducted by employees of the same hospital who will later be sued for malpractice in the death of the patient. There is simply no reasonable alternative, as the paucity of Medical Examiners assures no other qualified practitioners within a given area. As a result, some might question the veracity of the Pathologist's conclusions due to the "obvious bias" in such circumstances. With sufficient checks and balances assured by accreditation, certification, peer review, continuing quality improvement, and enforced ethical canons such issues are disposed of routinely as a matter of course. Challenges come when some may not like the outcome of the report, as is to be expected. Certainly serious allegations of wrong-doing should be investigated thoroughly, completely, and impartially but no more so than in any other arena. The first step to ensure confidence in the practice of forensic sciences is to require the accreditation and certification which will mandate a system of checks and balances is in place.

The lack of available recent data regards the overall needs and status of the Nation's forensic services providers makes a compelling case for one of, if not the most, important impediments. Annual practitioner needs assessments should be conducted to determine what those actively engaged in the profession need in terms of edu-

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[5] *http://www.cms.hhs.gov/clia/*
[6] *http://www.reuters.com/article/pressRelease/idUS238414+29-Jul-2008+PRN20080729*
[7] *http://thename.org/index.php?option=com_content&task=view&id=67&Itemid=69*
[8] *http://theiacme.com/iacme/accreditation.aspx*

cation/training, equipment, facilities, staffing, research, and other resources. Such information is simply unavailable at present.

*Q2. What is the level of funds the Federal Government currently allocates to forensic science research? What will the transitional issues be in changing from a mostly experience-based system to a rigorous scientific-based system?*

*A2.* Ascertaining the present level of federal funding to all forensic matters is beyond my ability, as it was beyond the NRC committee's.[9] Based on the 2009 budget, some observations can be made. Total federal research includes, ". . . $151.1 billion in federal R&D, an increase of $6.8 billion or 4.7 percent above the FY 2008 estimate. As a result, every major R&D funding agency will receive an increase greater than the expected rate of inflation, and in many cases the final FY 2009 numbers are larger than the budget request submitted by the previous administration . . .."[10] In the fiscal year 2009 year, the Office of Justice Programs is appropriated $156,000,000 for DNA related and forensic programs and activities, specifically include through the National Institute of Justice $151,000,000 for DNA analysis and capacity enhancement program; $5,000,000 for the Post-Conviction DNA Testing Program; and $25,000,000 for Paul Coverdell Forensic Science Improvement Grants.[11] Thus 0.1 percent of the total federal research money goes to ALL the forensics needs. By way of comparison, the budget includes $125,471,000 for the National Center for Complimentary and Alternative Medicine and $134,344,000 for the Center for Veterinary Medicine.[12] There is absolutely no assurance that any of this money will go to practitioner or end-user driven targeted research or that research done in Defense or similar areas will be made available as deliverables to the locals involved in forensic practice. In general, I believe a budget analyst would have to research the question in depth to be more precise than that.

In my specialty of medicolegal death investigation, the numbers are much easier to find. I believe the answer is basically none. The only funding stream open to Medical Examiners is the $25,000,000 Coverdell grant program—but it must be remembered that this pot is distributed across the board to all states via formula grants and a small portion for competitive grants—none of which are designated specifically to research. Arguably, some programs such as the Violent Death Reporting System impact the Medical Examiner/Coroner world, but not in terms of research directly applicable to the practice of the craft. The Bureau of Justice statistics did analyze the status of the country's Medical Examiners/coroners for the first time ever in 2005[13] but again this fact-finding assessment is hardly useful applied science research.

Medical Examiners have long clamored for increased funding in the field. True, a proportion of the U.S. Medical Examiners are affiliated with Medical Schools and may get small research stipends through such associations but these amount to basically to little more than slightly expanded basic service provisions (for example histology slides, chemical analyses, etc.). Serious questions such as the rates of and differences in wound healing, injury mechanisms in shaken/impact syndrome cases, and radiologic-clinical-pathologic correlation abound. The low fruit is remains and is easy to pick.

Personally speaking, I have never received federal dollars for research nor am I familiar with any Medical Examiner who has received such monies. In fact, despite being actively engaged in research throughout my career, I have only received a one-time, $1000 stipend to employ a medical student one summer to compile case data for me. Everything else I have done, including ongoing very expensive CT and MRI studies in child abuse cases, has relied exclusively on the charity of others. This is hardly a basis on which to build a system. Consider that of the in excess of $151 billion in federal research and development, millions are spent on medical research alone[14] and none on medicolegal death investigation. The potential for improvement here is obvious and the cost should be remarkably cheap.

As for transitional issues, movement to a more science-based system presumes the system in question lacks a scientific basis. Medicolegal death investigation, properly conducted, is headed by a board-certified physician specializing in the medical science of forensic pathology. The major issue in transition would then relate to bringing lesser systems "up to code." This would mean redefining the role of lay

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[9] *Strengthening Forensic Science in the United States: A Path Forward.* National Academies Press. 2009.

[10] *http://www.aaas.org/spp/rd/fy09.htm*

[11] H.R. 1105, One Hundred Eleventh Congress of the United States of America.

[12] H.R. 1105, One Hundred Eleventh Congress of the United States of America.

[13] *http://www.ojp.gov/bjs/abstract/meco04.htm*

[14] H.R. 1105, One Hundred Eleventh Congress of the United States of America.

Coroners who presently serve roughly half the U.S. population and ensuring in all cases a qualified physician is not only available to but responsible for each local jurisdiction.

Issues would relate to the inadequate numbers of board certified Forensic pathologists available to assume such a role. Given the present numbers of active full-time practitioners (estimated at 400) we would have to double the number of newly-minted practitioners from the present of slightly less than 40 to ~80. Recruiting and finding the resources for doubling the population in question then become related issues. Replacing the office of coroner, as called for by the NRC Committee, would require several matters be dealt with. As the Coroner is an elected and/or constitutional office, the relevant laws would have to be changed. Appropriate new law would need to be enacted (such as the Model Post Mortem Examinations Law proposed by the National Association of Medical Examiners[15]). Acceptable interim procedures and practices would need to be formulated. Adequate facilities, resources, and support would need to be put in place at the regional and/or local levels to handle a dramatically increased workload at whichever level would be involved. Additional costs for storage, transport, and processing of remains would be incurred regardless of which model system were established. The eventual fate of the office of Coroner would need to be decided—either fading into the annals of antiquity or revision into a scientifically trained medicolegal lay investigator.

Arguably some other forensic disciplines are on clearly less solid footing. In the vast majority of forensic sciences as a whole, the laboratorians' efforts began as scientific endeavors to answer specific questions. The system is really built more on applied science answering targeted questions than systematic research as many other applications practice. Some issues can be anticipated to be similar to those faced in medicolegal death investigation—facilities, resources, and personnel—while maintaining active case throughput. Incumbent with such a dramatic increase in staff and labs would require sufficient accreditation and certification opportunities to keep up with the increased dramatically demand for same, if the recommendation to require accreditation and certification. Others areas of concern might include actual prioritization/conduction of research and translation from the theoretical to the practical. Obviously, the oversight of such an undertaking would be important—who will, without bias, ensure compliance with regulations is uniform across the board. The NRC assigned the duty to their chief recommendation, the National Institute of Forensic Sciences.

Acceptance of all the foregoing is assumed by those directly involved at various levels in the affected systems. Given the track record, as relates to the existing system, this may a pipe dream. Without strong, public, and broad support for the suggested improvements, there is little reason to believe that the net result will be anything but the same.

Another issue would be understanding of and acceptance of the new system by users of the services. All the change would be for naught if the adversarial system of the courtroom failed to accept them. There is precious little reason to believe that the actual test results will dramatically differ from those presently achieved. Those same present results that we know from years of experience are valid, although dismissed by some (to whom the data are unfavorable) as somehow flawed, will remain valid. The interpretations of results, as presented in courts, will remain inclusionary to some accused and exclusionary to those many who do not make it to trial. Without addressing the undue influence of the adversarial legal system on the reportage of scientific testing, there can be little hope of a better outcome. The bias inherent in a system where (almost uniformly) the prosecution must use an accredited lab and a certified scientist because they are already employed for that specific purpose and therefore the prosecution cannot afford to solicit multiple persons for the purpose of proving a case the crime lab's own scientist said there wasn't one. Such extravagance is not a wise use of limited tax dollars. The defense argues it must use the same crime lab already extant and when the result is not to their liking, argues by insinuation that the analysis is somehow biased or flawed but such ad hominem attack amounts to nothing more than empty words. Expert shopping, an option chiefly available to the defense which is free to use whatever engaged report(s) favor their position while conveniently never disclosing the many more support the prosecution's case, must end. Some will protest loudly that such a fundamental change in their ability to seek out qualified professionals jeopardizes their ability to represent their position. Such an argument is easily overcome if all solicited expert reports—on both sides—are automatically allowed, regardless of outcome. In my opinion, this would be one of the most difficult issues to address if we are to effectively modify our system.

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[15] *http://thename.org/index.php?option=com_content&task=view&id=97&Itemid=41*

*Q3. What federal resources would be required to establish a National Institute of Forensic Sciences?*

*A3.* The NRC Committee said of the proposed NIFS:

> *"The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country. This can only be done with effective leadership at the highest levels of both Federal and State governments, pursuant to national standards, and with a significant infusion of federal funds."* [16]

"The forensic science enterprise needs strong governance to adopt and promote an aggressive, long-term agenda to help strengthen the forensic science disciplines. Governance must be strong enough—and independent enough—to identify the limitations of forensic science methodologies, and must be well connected with the Nation's scientific research base to effect meaningful advances in forensic science practices. The governance structure must be able to create appropriate incentives for jurisdictions to adopt and adhere to best practices and promulgate the necessary sanctions to discourage bad practices." [17]

The resources existing within the Federal Government can be expected to include the Department of Justice; the National Institute of Justice; the Federal Bureau of Investigation, the Bureau of Alcohol, Tobacco, and Firearms; the Office of the Armed Forces Medical Examiner; The National Institute of Standards and Technology; the Department of Defense; the Department of Health and Human Services; the Drug Enforcement Administration; the National Science Foundation; the National Academy of Sciences; the Institute of Medicine; the Library of Medicine; the Department of Homeland Security; and other agencies.

The financial resources can be anticipated to be substantial. I have no experience in the federal funding world and fell uncomfortable trying to predict how these existing entities might use their resources towards the forensics effort.

**Questions submitted by Representative Adrian Smith**

**Prioritization of NAS Recommendation**

*Q1. Among the technical recommendations in the NAS report, what one or two stand out to you as the highest priority, and why?*

*A1.* Although the NRC committee charged with studying the issues advised against separating the initiatives or emphasizing one to the exclusion of others, the reality is that such a broad-reaching revision of such a far-reaching vision may not be easily achieved without dividing the response. Ideally all the recommendations should proceed simultaneously on their own intersecting paths. If we separate the component proposals and attempt to sort by category, the recommendations can be simplified to address: accreditation/certification, education/training, research, oversight, and medicolegal death investigation.

Professionally, I am keenly aware of the many needs of the Medical Examiner/Coroner system nationally, however, I believe the greater good is served in addressing two issues which would arguably have the most impact the most quickly—accreditation/certification and research.

Accreditation of existing labs is a seeming daunting task given the lack of existing investment in the process. The good news is that this should be much easier to achieve than many fear because a sizable percentage of State crime labs already have accreditation. Other labs are typically small and I believe lack of a concerted effort is likely the biggest sticking point in moving to full accreditation. I can speak from the personal experience as the former director of a State crime lab system with 175 employees who oversaw a 10 lab operation spread across a broad geographic territory go from zero to full accreditation in basically two years. There were naysayers early in the process, especially since there were basically no new State funds set aside for the effort. This can only be overcome by achieving buy-in from staff first, followed by users. The mantra must reflect a philosophy that "one does not strive for mediocrity." This case example of how to achieve success though one's own efforts reflected well of an excellent staff but credit for the financial aspects must be given to the National Institute of Justice, who, working through the National Foren-

[16] *Strengthening Forensic Science in the United States: A Path Forward.* National Academies Press. 2009.
[17] *Ibid.*

sic Science Technology Center and other partners within the Forensic Resource Network (Marshall University) showed that indeed the impossible can be achieved if one merely sets the bar high enough and settles for no less than the best. A relatively small financial investment continues to pay massive dividends. Top management must aggressively pursue the goal if the mission is to succeed.

Employee certification is a slightly more difficult matter as a smaller percentage of crime lab personnel already possess the requisite background. As this is a personal achievement, there may be policy requiring revision in some areas to allow governmental employers to require and/or fund this credentialing process. In some disciplines, there may need to be special provision made to "grandfather in" existing scientific personnel. Another obstacle would be the strain the volume of scientists requiring certification would place on the existing system.

In the area of death investigation, the present status of accreditation and certification are to a certain extent reversed for physicians and minimal to none for large numbers of lay coroners. Some 85 percent of pathologists active in the field have Pathology boards and 75 percent sub-specialty certification.[18] All have the requisite physician training. Professional practice standards have been promulgated. Only a minority of existing Medical Examiner facilities have achieved accreditation. Usually this shortcoming relates to insufficient resources, staff, or facilities. Regardless, the root cause would need to be addressed. Lay coroners have only a handful of operations (eight total[19]) achieving any formal accreditation. Formalized recognition of basic skills is available through the American Board of Medicolegal Death Investigation,[20] however, this has been primarily achieved by lay investigators employed by Forensic Pathologists. If the coroners were to achieve the necessary training to obtain this credential, it should dramatically improve death investigation in the affected jurisdictions—up to half the U.S. population.

Both certification and accreditation would ultimately serve to provide confidence in the fairness of the analyses being conducted and impartiality and qualification of the analyst. Structures are presently in place for both, however, the stress of scale may well overburden the existing process. Advantages of the professionalization of the practice and the practitioner in the achievement of these goals would include adoption of ethical codes and continuous quality improvement as part of the criteria for the standard.

The other issue of utmost concern would be validation of the underlying science. As there are individuals presently incarcerated or awaiting trial, personal liberty is at stake. Despite the foundation of all forensics in the underpinnings of science, the focus has not been sufficiently broad. In order to confirm what experience tells us is valid and to restore full confidence by the users in the truth and accuracy of the system, sufficient validation should be aggressively pursued in those areas most often used and most often challenged.

**Prioritization of Research Needs**

*Q2. Has the forensic science community attempted to prioritize research needs across various disciplines? If not, in your opinion what areas of research are likely to contribute the greatest benefits to the legal system through increased funding?*

*A2.* I do not believe there has been anything approaching a national plan on forensics research. The field really originated by conducting targeted experiments to answer case-specific questions. The tradition basically continues to the present day, although obviously there has been more extensive research conducted through the years. Another benefit of the proposed NIFS would be to ensure such a strategy were created and implemented.

Specifically regards the research likely to be most cost-effective most quickly would be validation of pattern-type forensic disciplines (fingerprint analysis, footwear impression comparison, firearms examination, document analysis, etc.). Another important area would be to expand preliminary work done on bias and see the extent to which it actually could impact a case. It is imperative such research on bias not be biased itself—if conducted with an eye to "proving" bias by governmental labs, a much more obvious potential bias (solicited contract forensic analysis) might be overlooked, creating an illusion that one is a problem while the other is not. Individuals involved in such research should absolutely have no real or perceived bias which might adversely impact the outcome of the studies.

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[18] Executive Director, National Association of Medical Examiners.
[19] *http://theiacme.com/iacme/accreditation.aspx*
[20] *http://medschool.slu.edu/abmdi/index.php*

ANSWERS TO POST-HEARING QUESTIONS

*Responses by Peter J. Neufeld, Co-Founder and Co-Director, The Innocence Project*

**Questions submitted by Chair David Wu**

*Q1. What is the level of funds the Federal Government currently allocates to forensic science research?*

*A1.* The Federal Government allocated $106 million to DNA related forensics programs in 2008 the bulk of which went to DNA backlog reduction. Non-DNA forensic program spending by the Federal Government in 2008 has not yet been calculated, but in 2007 that amount was $16.5 million.

Of the money spent on DNA, approximately $9 million was allocated for research. Little to none of the non-DNA forensic funding is spent on research; the Coverdell Forensic Science Improvement Grant Program awards grants primarily to eliminate backlogs and to train and employ forensic laboratory personnel.

*Q2. What will the transitional issues be in changing from a mostly experienced-based system to a rigorous scientific-based system?*

*A2.* In order to transition forensic sciences to a rigorous science-based system, basic and applied research on the validity and reliability of assays, technologies, and devices will need to be conducted by an independent, science-focused federal agency. After this research is completed, standards for methodology, reporting procedures, and court testimony will need to be developed and implemented so that all assumptions made, conclusions reached, and inferences drawn by forensic science expert witnesses will be supported and confirmed by research.

For forensic practitioners, the greatest transitional issues will involve continuing education, training, and professional development so that they can meet certification requirements in the fields in which they conduct examinations. As the research evolves in each discipline, so too will the guidance on how evidence is presented and how the forensic practitioners can testify in court.

For public crime laboratories, the greatest transitional issues will involve accreditation to the ISO 17025 level. While most publicly-funded crime laboratories are accredited, the majority of crime labs are not accredited to this more rigorous international standard. States and localities will also need to be encouraged to make their crime laboratories independent of law enforcement agencies to ensure a working environment free of external pressures and bias.

Finally, on an immediate and ongoing basis, significant and continuous educational programs about the report's findings regarding non-DNA forensic assays, devices, and technologies and their limitations needs to be conducted for judges and criminal practitioners, and updated as the research progresses.

*Q3. What federal resources would be required to establish a National Institute of Forensic Science?*

*A3.* Many of the "pieces" required for a National Institute of Forensic Science (NIFS) exist in the Federal Government today. The National Science Foundation and the National Academy of Sciences have experience in competitive grant-making and have existing relationships with research universities and bodies to whom such grants would be made. Once the research is completed, standard setting could be done by the National Institute of Standards and Technology. Lastly, the compliance and enforcement needs could be handled internally at NIFS and/or in cooperation with other law enforcement entities. NIFS could be modeled after the lean and flexible regulatory body that administers the Clinical Laboratory Improvement Amendments (CLIA) at the Centers for Medicare & Medicaid Services. CLIA oversees all clinical laboratory diagnostic testing in the United States and employs just 27 people in their administrative office and 30 employees over 10 regional cities across the Nation.

**Questions submitted by Representative Adrian Smith**

**Accreditation**

*Q1. Mr. Neufeld, you emphasize in your testimony the importance of laboratory accreditation to ensuring quality control, and Mr. Marone noted that the overwhelming majority of crime labs used by prosecutors are now accredited. Does the Innocence Project also make sure to support work only from accredited labs? Why or why not?*

*A1.* The National Academy of Sciences' (NAS) report on *Strengthening Forensic Science in the United States'* seventh recommendation[1] is for the mandatory accreditation of all crime laboratories and the certification of all practitioners.

It is critical, however, that the existing, voluntary accreditation standards are assessed for strength and reliability. The largest crime laboratory accreditation organization in the United States, the American Society of Crime Laboratory Directors Laboratory Accreditation Board, accredit 362 laboratories (the majority of which are publicly funded). However, only 80 of their laboratories are accredited under their "international" program—the higher tier of crime lab accreditation that is most compliant with the international standard, ISO/IEC 17025. That program notably omits three important elements that are present in its lower tier accreditation program: (1) blind proficiency testing, (2) requirements for safety equipment and the physical design of the lab, and (3) requirements for written objectives.

The NAS report also notes that, "[a]ccreditation is just one aspect of an organization's quality assurance program, which also should include proficiency testing where relevant . . .. In the case of laboratories, accreditation does not mean that accredited laboratories do not make mistakes, nor does it mean that a laboratory utilizes best practices in every case, but rather, it means that the laboratory adheres to an established set of standards of quality and relies on acceptable practices within these requirements.[2] . . . Accreditation cannot guarantee high quality—that is, it cannot guard against those who intentionally disobey or ignore requirements."[3]

In fact, past allegations of negligence or misconduct filed under the federal Coverdell program have included accredited laboratories. Consequently, there is a need to assess the strength of current accreditation standards and to make sure make sure that the standards reflect best practices and are as stringent as they can be. Moreover, for the solo or two person laboratory, current accreditation requirements may be unduly burdensome. It is certainly possible that NIFS would make the accreditation requirements more rigorous on matters that affect reliability of results yet more accessible for the excellent but very small forensic laboratories.

The Innocence Project typically engages accredited laboratories for conducting post-conviction DNA testing in their cases. At times—particularly when more advanced testing on minute samples is required—a two person laboratory that has not applied for accreditation, Forensic Science Associates (FSA), has provided more reliable results than the accredited laboratories. Indeed, Mr. Marone is personally familiar with the extraordinary high quality work accomplished by FSA. In the Earl Washington DNA exoneration, the initial post-conviction DNA typing was conducted by Virginia's ASCLD–LAB accredited State forensic laboratory. Subsequent testing was conducted by FSA. Not only did the FSA results contradict the Virginia State lab results but FSA concluded that the State lab had reached an erroneous conclusion. When the then director of the State lab refused to conduct a meaningful investigation of what went wrong or even acknowledge that an error had been made, the Governor asked ASCLD–LAB to intervene and conduct an external investigation. ASCLD–LAB's report, which I attach to this document, confirmed that FSA's results were both correct and reliable and that the accredited Virginia laboratory had indeed made a serious error. Nevertheless, within days of that report, ASCLD–LAB re-accredited the Virginia State lab, without so much as a comment on the impact of its own highly critical external investigation in the Earl Washington case.

**Admission of Evidence**

*Q2. Mr. Neufeld, you state in your testimony that "it is absolutely clear—and essential—that the validity of forensic techniques be established 'upstream' of the court, before any particular piece of evidence is considered in the adjudicative process." Based on the NAS report findings then, are you calling for courts to deny admission of forensic evidence from all disciplines except DNA analysis? If so, do you think that will improve the justice system's ability to convict the guilty and protect the innocent?*

*A2.* It is not the job of judges and lawyers to become scientific experts, and hardly a responsibility we can place on the shoulders of a jury. This is the reason why clarifying the specific reliability of all such evidence and the parameters for testifying on such evidence are so critical to the administration of justice. When forensic

[1] *Strengthening Forensic Science in the United States: A Path Forward,* Committee on Identifying the Needs of the Forensic Science Community, The National Academies Press (2009), p. 7–18.

[2] *Ibid.,* p. 7–2.

[3] *Ibid.,* p. 7–3.

evidence enters the courtroom, it should be sound and not used beyond its demonstrated scientific limits. The NAS report states "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."[4]

The Report divides forensic disciplines into laboratory-based and experience-based disciplines. Laboratory-based 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.[5] The level of scientific development and evaluation varies substantially among the forensic science disciplines."[6] Some experience-based disciplines (fingerprint analyses) have had the support of more dedicated research in the past compared to other experience-based disciplines (lip print, ear print comparisons[7]). Secondly, experience-based disciplines suffer from the same problem—"A body of research is required to establish the limits and measures of performance and to address the impact of sources of variability and potential bias. Such research is sorely needed, but it seems to be lacking in most of the forensic disciplines that rely on subjective assessments of matching characteristics."[8]

This strongly suggests that non-DNA forensic evidence should not be used to individualize in the courtroom, and the entire criminal justice system would be well served by respecting this fact as soon as possible. This is not, however, to say that non-DNA forensic evidence has no place in the courtroom, nor to say that there should be a rule or rules immediately imposed upon courts to ban all such evidence. The report offers no judgment about closed or pending cases and instead offers forward looking recommendations for the future of forensic science. We agree with the report. Indeed, each case, post-conviction or pending, must be considered on its own merits.

**Prioritization of NAS Recommendations**

*Q3. Among the technical recommendations in the NAS report, what one or two stand out to you as the highest priority, and why?*

*A3.* Aside from the NAS report's primary recommendation to create a National Institute of Forensic Science, the two priority recommendations for the forensic community should be funding research (Recommendation #3 and #5) and developing standards from that research (Recommendation #6). In competitively funding peer-reviewed research to establish validity and reliability of the non-laboratory-based forensic disciplines, Congress would be applying and requiring the same scientific principles and processes for validation that had been utilized so successfully for forensic DNA. Once the research has been satisfactorily completed and the technique, method or assay validated, then standards must be developed so that reliable procedures and practices can be provided to the forensic examiners in a shovel-ready format.

**Prioritization of Research Needs**

*Q4. Has the forensic science community attempted to prioritize research needs across various disciplines? If not, in your opinion, what areas of research are likely to contribute the greatest benefits to the legal system through increased funding?*

*A4.* In terms of prioritizing research, I can't speak for the forensic science community. To date, the non-DNA forensic science community has had to use virtually all of the funding it receives for addressing backlog issues and funding laboratory needs. In the past, there has been little time and virtually no money available for research efforts. Previous needs assessments, The U.S. Department of Justice report, *Forensic Sciences: Review of Status and Needs* (February 1999 and the American Society of Crime Laboratory Directors' *180–Day Study Report: Status and Needs of United States Crime Laboratories* (May 2004) did not prioritize the research needs in the forensic sciences intended to spur the change in practice that the NAS report deems essential to justice. It is the Innocence Project's position that areas of research should be prioritized by areas of greatest needs. We look forward to working with Congress to find a way to assess this prioritization.

[4] *Ibid.,* p. S–5.
[5] *Ibid.,* p. 5–1.
[6] *Ibid.,* p. S–5.
[7] *Ibid.,* p. S–6.
[8] *Ibid.,* p. S–6.

# ASCLD/LAB
# LIMITED SCOPE
# INTERIM INSPECTION REPORT

**COMMONWEALTH OF VIRGINIA**
**DIVISION OF FORENSIC SCIENCE**
**CENTRAL LABORATORY**

APRIL 9, 2005

## INTRODUCTION

This is the report of the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) limited scope interim inspection of the Commonwealth of Virginia Division of Forensic Science Central Laboratory Biology/DNA Unit, located in Richmond, Virginia. This inspection was conducted at the request of the Laboratory System Director, Dr. Paul B. Ferrara, by letter dated October 1, 2004.

The ASCLD/LAB inspection team consisted of the following members:

Rodney H. Andrus, Staff Inspector, ASCLD/LAB, Fresno, CA.
Pat W. Wojtkiewicz, North Louisiana Criminalistics Laboratory, Shreveport, LA. (October 24-27, 2004 visit).
James Iverson, Minnesota Bureau of Criminal Apprehension, St. Paul, MN. (December 13-15, 2004 visit).

The ASCLD/LAB Board of Directors liaisons to the inspection team were:

Robin W. Cotton, PhD, Orchid Cellmark, Germantown, Maryland
Kenneth E. Melson, Alexandria, Virginia

The on-site inspection was conducted during the periods of October 24-27, 2004, and December 13-15, 2004, at the Virginia Division of Forensic Science (DFS) Central Laboratory in Richmond, Virginia.

This inspection focused on the review of the examination documentation and reports for the Virginia Division of Forensic Science Case File No. 81N-6691, involving a 1982 sexual assault and homicide, and associated laboratory analytical and operational procedures. After an initial on-site visit, a revisit of the laboratory was conducted for the purposes of evaluating and clarifying issues that had not been resolved during the initial inspection. Other material associated with the case, more fully described later in this report, was also reviewed.

## LABORATORY OVERVIEW

The Virginia Division of Forensic Science Central Laboratory provides full services to the central region of the Commonwealth of Virginia as well as specialized services statewide. The Central Laboratory is one of four laboratories in the Virginia Division of Forensic Science Laboratory System, and is located at 700 North 5th Street, Richmond, Virginia. The Laboratory provides services in Controlled Substances, Toxicology, Trace Evidence, Biology, Firearms/Toolmarks, Latent Prints, Questioned Documents and Digital Evidence. The Laboratory has a staff of 88 testifying analysts and 60 support staff. The DFS has been accredited by ASCLD/LAB since January 5, 1989.

## BACKGROUND

Rebecca Williams, a 19 year-old mother of three children, was raped and fatally stabbed in her home in Culpepper, Virginia, on June 4, 1982. Before her demise, she told a policeman that her attacker was a black man acting alone and who was a stranger to her. An autopsy was performed by Dr. James Beyer, Deputy Chief Medical Examiner. It disclosed that the victim suffered 38 stab wounds to the neck, chest, and abdomen, 14 of which penetrated internal organs and could, alone,

have caused death if untreated. Vaginal smears obtained during the autopsy were positive for the presence of relatively intact sperm and male prostatic enzyme. (See *Washington v. Commonwealth*, 323 S.E.2nd 577 (Va. 1984)). Evidence collected at the crime scene and elsewhere was submitted to the Virginia Division of Forensic Science (DFS) on June 7, 1982, (then known as the Bureau of Forensic Science) for analysis.

The initial evaluation of the evidence submitted in June 1982 included the identification and characterization of potentially probative biological and other evidence materials. Relevant to the biological evidence, the analysis involved the determination of the presence of semen, bloodstains and hair. In part, three items were found to contain semen with spermatozoa: a blanket (Item 25), two vaginal smears from the victim (Item 45), and two bloodstained vaginal swabs from the victim (Item 58). A smear was subsequently prepared from one of the swabs. No definitive results indicating a possible semen contributor were obtained with the serological typing methods employed. No blood examinations were conducted on the victim's fingernail scrapings, Items 55 and 56. Ten Negroid hairs and hair fragments were recovered from the shirt pockets, Item 72, of a shirt that was found by the victim's husband in a bedroom dresser about a week after the crime, and that did not belong to the residents. The above results, and others, were reported in a Certificate of Analysis dated August 19, 1982, and an Amended Certificate dated August 26, 1983. Three supplemental Certificates of Analysis were issued by the DFS reporting examination results on blood, saliva and hair exemplars from several initial suspects. (See the Certificates dated August 27, 1982, November 10, 1982, and December 9, 1982).

Earl Washington, Jr., an African American who is also known as Earl Junior Washington (Washington), became a suspect in the rape and murder of Rebecca Williams when he was arrested on May 21, 1983, on unrelated charges. A Hair and Saliva Samples Kit from the suspect was delivered to the DFS two days later. Two Certificates of Analysis, dated August 12, 1983 and September 8, 1983, were subsequently issued indicating that Washington's blood type was not consistent with the blood type of the victim or the blood recovered from the crime scene (which was consistent with the victim's).[1] Hair comparisons between the known hair exemplars from Washington submitted to the DFS and the hairs recovered from Item 72 were not conducted because the exemplar hair sample was inadequate for comparison.[2]

Washington's jury trial began on January 18, 1984, and he was convicted of capital murder of Rebecca Williams on January 20, 1984. On March 20, 1984, the trial court entered a final order imposing the death sentence. His conviction was affirmed by the Virginia Supreme Court (*Washington v. Commonwealth*, 323 S.E.2nd 577 (Va. 1984)) and the United States Supreme Court denied the Petition for Writ of Certiorari (*Washington v. Virginia*, 471 U.S. 1111 (1985)). Washington's state and federal habeas corpus petitions were also denied.

With the advent of DNA typing methods, additional analyses were conducted in 1993 and 1994. The remaining portion of the vaginal swab (Item 58) was examined with both the RFLP and HLA DQα DNA typing methods. No DNA profile was obtained by the RFLP analysis. HLA DQα

[1] Spermatozoa and/or spermatozoa heads were identified in five stains on a royal blue blanket, Item 25. Secretions in four of those stains were a type A, PGM 1, which is inconsistent with Washington, who is a type O, PGM 2-1. In a post-conviction collateral attack, Washington's habeas counsel argued that the trial counsel was ineffective for not arguing at trial that this test result was exculpatory. The Fourth Circuit Court of Appeals discussed this issue and the Commonwealth's rebuttal in the federal habeas corpus in *Washington v. Murray*, 4 F.3d 1285 (4th Cir. 1993).

[2] In a later federal habeas appeal, the court indicated that a request by defense counsel for a comparison between the hairs from the shirt and Washington's facial hair was denied. *Washington v. Murray*, 952 F.2d 1472, 1478 (4th Cir. 1991).

typing results were reported for the sperm fraction of the vaginal swab extract. The possible source was not identified in the Certificate of Analysis dated August 31, 1993, which is summarized in the table below.

DFS CERTIFICATE OF ANALYSIS DATED AUGUST 31, 1993
(DNA Analysis by RFLP and PCR at HLA DQα Locus)

| Item # | Description | Results | R. Williams | C. Williams | Washington | Tinsley | Comments |
|---|---|---|---|---|---|---|---|
| Item 48 | R. Williams known blood sample | No RFLP profile | | | | | |
| Item 58 | Vaginal swab (DFS) | No RFLP profile | | | | | |
| Item 48 | R. Williams known blood sample | PCR DQα Profile= 4, 4 | | | | | |
| Item 58 | Vaginal swab (DFS) Sperm fraction | PCR DQα profile = 1.1, 1.2, 4 | Different profile | Different profile | No sample submitted | No sample submitted | The non sperm fraction was inconclusive |
| Item 59 | C. Williams known blood sample | PCR DQα profile = 4, 4 | | | | | |

In October 1993, the Virginia Attorney General and Washington's attorney, Gerald Zerkin, reached an agreement for further testing, memorialized in a letter dated October 13, 1993. Pursuant to the agreement, additional blood was obtained from Washington and sent to the DFS and to CBR Laboratories, Inc., a forensic laboratory retained by Mr. Zerkin. Two microscopic slides prepared from the vaginal smear, Item 45, were sent by the DFS to CBR Laboratories, Inc., for PCR DNA comparison between the material on the slides and the genetic material extracted from Washington's blood. Mr. Bing of CBR Laboratories, Inc. conducted the analysis. He was unable to obtain a profile from the slides.

An additional provision of the agreement referred to above was for the DFS to compare Washington's blood with "the material prepared from the vaginal swab itself . . . ." Washington's HLA DQα profile derived from his newly provided reference sample was compared to the profile obtained from the sperm fraction of Item 58, and the examiner determined that Washington, individually or in combination with Rebecca Williams or her husband, could not have contributed the 1.1 allele found in the Item 58 sperm fraction profile. This result was reported in the Certificate of Analysis dated October 25, 1993, illustrated in the following table:

DFS CERTIFICATE OF ANALYSIS DATED OCTOBER 25, 1993
(DNA Analysis by PCR at HLA DQα Locus)

| Item # | Description | Results DQα | Washington | R. Williams | C. Williams | Comments |
|---|---|---|---|---|---|---|
| Item 1 | Washington's known blood sample | 1.2, 4 | | | | |
| Item 58 | Vaginal Swabs (DFS) sperm Fraction | 1.1, 1.2, 4 | Excluded* | Excluded* | Excluded* | See 8/31/93 report |
| Item 48 | R. Williams known blood sample | 4, 4 | | | | See 8/31/93 report |
| Item 59 | C. Williams known blood sample | 4, 4 | | | | See 8/31/93 report |
| * Unless another individual possessing a 1.1 allele is also present. | | | | | | |

In January 1994, negatives of the photographs of the test results of the PCR HLA DQα typing on the vaginal swab (Item 58) and the reference samples for R. Williams, C. Williams and Washington, and the positive and negative control samples, were sent to Roche Molecular Systems in care of Dr. Henry A. Erlich, Director of Human Genetics and one of the developers of the HLA DQα typing technology. At the request of Barry Weinstein and Robert Hall, two of Washington's post-conviction attorneys, Dr. Erlich was asked to evaluate the test results obtained with the AmpliType HLA DQα PCR Amplification and Typing Kit by the DFS. His evaluation concluded that the results cast significant doubt about Washington's contribution to the sample. In his January 13, 1994, report, Dr. Erlich went on to say:

> The presence of the directly demonstrated 1.1 allele cannot have been contributed by Mr. Washington, the victim, or her husband. While the presence of the 1.2 allele can be inferred from the relative dot intensities, the dots do not indicate that the 1.2 allele should be paired in a genotypic combination with the 4 allele. In fact, the data support a genotypic combination of the 1.2 allele with the 1.1 allele.

Results of additional HLA DQα typing on Item 25, the royal blue blanket, were reported in the Certificate of Analysis dated January 14, 1994, indicating that Earl Washington Jr. was not the donor of the HLA DQα type located on the blanket. In addition, the vaginal smears, Item 45, were examined and no profile was obtained. The table below summarizes those findings.

DFS CERTIFICATE OF ANALYSIS DATED JANUARY 14, 1994
(DNA Analysis by PCR at HLA DQα Locus)

| Item | Description | Results | Washington | Tinsley | Pendleton | Comments |
|---|---|---|---|---|---|---|
| Item 25, stain A, non-sperm fraction | Royal blue blanket | Mixture 1.1, 4, (2) 1.3* | Eliminated 1.2, 4 | Not submitted | Eliminated 4, 4 | |
| Item 25, stain A, sperm fraction | Royal blue blanket | 1.1, 4 | Eliminated 1.2, 4 | Not submitted | Eliminated 4, 4 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Item 25, stain B, non-sperm fraction | Royal blue blanket | Mixture 1.1, 4, (2), 1.3* | Eliminated 1.2, 4 | Not submitted | Eliminated 4, 4 | |
| Item 25, stain B, sperm fraction | Royal blue blanket | 1.1, 4 | Eliminated 1.2, 4 | Not submitted | Eliminated 4, 4 | |
| Item 25, stain C, non-sperm fraction | Royal blue blanket | Mixture 1.1, 4, (2) (1.3) | Eliminated 1.2, 4 | Not submitted | Eliminated 4, 4 | |
| Item 25, stain C, sperm fraction | Royal blue blanket | Mixture 1.1, 4, (2) | Eliminated 1.2, 4 | Not submitted | Eliminated 4, 4 | |
| Item 25, stain D, non-sperm fraction | Royal blue blanket | Mixture 1.1, 1.2, 4, (2) | Eliminated, but not as clearly 1.2, 4 | Not submitted | Eliminated 4, 4 | Believes genotype of D is 1.1, 1.2 |
| Item 25, stain D, sperm fraction | Royal blue blanket | Mixture 1.1, 1.2, 4* | Eliminated, but not as clearly 1.2, 4 | Not submitted | Eliminated 4, 4 | Believes genotype of D is 1.1, 1.2 |
| Item 58 | Pendleton's standard | 4, 4 | | | | |
| Item 45 | Vaginal smears (DFS) | Insufficient material | | | | |
| Numbers in ( ) indicate a weak allele (equal to or more intense than C dot). | | | | | | |
| An * indicates a very weak allele (less intense than C dot) | | | | | | |

As a result of the DNA testing, then Governor Wilder commuted Washington's death sentence on January 14, 1994, to life imprisonment with the possibility of parole. Purportedly, the Governor did not offer further relief to Washington because Washington was not absolutely eliminated as a contributor of the sperm fraction in Item 58.

In 2000, newly discovered smears collected by the Medical Examiner's office during the original investigation were submitted to the laboratory for analysis. This evidence consisted of vaginal (two smears, Items 121A and B), labial (two smears, Items 121C and D), anal (two smears, Items 121 E and F), thighs (two smears, Items 121 G and H) and buttocks (two smears, Items 121 I and J) smears collected from the victim. Previously examined evidence was also resubmitted at this time for additional testing. Using the more recently developed Promega PowerPlex 1.1 and 2.1 STR typing methods, which were implemented in the DFS in 1998 and 2000, respectively, STR DNA typing results were reported for stains on the blanket (Item 25), vaginal smear (Item 58) and one of the vaginal smears submitted from the Medical Examiner (Item 121A). Analyses were also performed on fingernail scrapings from the victim, (Items 55 and 56). Conclusions of the testing were presented in a Certificate of Analysis dated September 8, 2000, reflected in the table below.[1] The Director of the DFS informed Governor Gilmore of these results on September 18, 2000, by letter, in addition to providing a copy of the Certificate to his office.

<u>DFS CERTIFICATE OF ANALYSIS DATED SEPTEMBER 8, 2000</u>
(Promega PowerPlex 1.1 and 2.1 STR Typing)

| Item # | Description | Results | R. Williams | C. Williams | Washington | Tinsley's Database Profile | Comments |
|---|---|---|---|---|---|---|---|

[1] This Certificate of Analysis was supplemented by a letter dated November 2, 2004, to the Commonwealth's Attorney to correct the Table of PowerPlex 1.1 Typing Results by adding the results of the analyses on Items 55 and 56, fingernail scrapings.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Items 55 & 56 | Victim's fingernail scrapings | Mixture | Major Contributor | | | | No minor Contributor was identified |
| Item 72 | Shirt from Dresser | No conclusion | | | | | Limited amount of DNA |
| Item 121A, Non-sperm fraction | Vaginal smear (ME) | Mixture | Cannot be eliminated | No conclusion | Eliminated | **Eliminated** | |
| Item 121A, sperm fraction | Vaginal smear (ME) | No DNA profile | | | | | |
| Item 58, Non-sperm fraction | Vaginal smear (DFS) | Mixture | Cannot be eliminated | Eliminated | Eliminated | **Eliminated** | |
| Item 58, sperm fraction | Vaginal smear (DFS) | Mixture | **Eliminated** | Eliminated | Eliminated | **Eliminated** | **This profile was searched against the DNA data bank with no results** |
| Item 25, stain A (sperm and non-sperm fractions) | Royal blue Blanket | Mixture | Cannot be eliminated | Eliminated | Eliminated | Cannot be eliminated | |
| Item 25, stain B (sperm and non-sperm fractions) | Royal blue Blanket | Mixture | Cannot be eliminated | Eliminated | Eliminated | Cannot be eliminated | |
| Item 25, stain 1 | Royal blue Blanket | Mixture | Cannot be eliminated | Eliminated | Eliminated | | |
| Item 25, stain D, non-sperm fraction | Royal blue Blanket | Mixture | Cannot be eliminated | Eliminated | Eliminated | Cannot be eliminated | |
| Item 25, stain D, sperm fraction | Royal blue Blanket | Profile | Eliminated | Eliminated | Eliminated | Consistent with | **DNA data bank search yielded Tinsley** |

On September 14, 2000, a blood sample from Kenneth Tinsley was received by the DFS. That sample was analyzed using the Promega PowerPlex 1.1 and 2.1 systems and compared with the profiles obtained and reported in the September 8, 2000 report.[4] Thereafter, the Governor granted Washington an absolute pardon for the rape and murder of Rebecca Williams on October 2, 2000,[5] stating that "[i]n my judgment, a jury afforded the benefit of the DNA evidence and the analysis available to me today would have reached a different conclusion regarding the guilt of Earl

[4] In the September 8, 2000 report, Tinsley's data bank profile had been used as a reference.

[5] The court in *Washington v. Barnhart*, 322 F.Supp.2d 692 (W.D.Va. 2004) indicates that the pardon occurred on September 7, 2000.

Washington."[6] However, the Governor did not exonerate Washington on the basis of factual innocence.

A Certificate of Analysis dated October 18, 2000, was then issued reporting that the findings of the analyses using Tinsley's known standards were consistent with the results from the September 8, 2000 Certificate of Analysis, that had used Tinsley's DNA profile obtained from the DNA databank. That report is summarized in the following table:

DFS CERTIFICATE OF ANALYSIS DATED OCTOBER 18, 2000
(Promega PowerPlex 1.1 and 2.1 STR Typing)

| Item # | Description | Results | R. Williams | Tinsley | Comments |
|---|---|---|---|---|---|
| Item 121A, non-sperm Fraction | Vaginal smear (ME) | Mixture (9/8/00 Report) | Cannot be eliminated | Eliminated | Other suspects eliminated |
| Item 121A, sperm fraction | Vaginal smear (ME) | No DNA profile (9/8/00 Report) | | | |
| Item 58, non-sperm fraction | Vaginal smear (DFS) | Mixture (9/8/00 Report) | Cannot be Eliminated | Eliminated | Other suspects eliminated |
| Item 58, sperm fraction | Vaginal smear (DFS) | Mixture (9/8/00 Report) | Eliminated | Eliminated | |
| Item 25, stain D, non-sperm fraction | Royal blue blanket | Mixture (9/8/00 Report) | Cannot be eliminated | Cannot be Eliminated | Other suspects Eliminated |
| Item 25, stain D, sperm fraction | Royal blue blanket | Profile (9/8/00 Report) | Eliminated | Consistent With | 1 in 6.0 billion. Other suspects eliminated |

In September 2002, Washington filed a civil suit in federal court against state law enforcement officers and prosecutor who participated in his arrest, detention and prosecution.[7] The DFS is not a named defendant in that suit, which is still continuing.

Pursuant to a discovery request in Washington's federal civil suit, evidence from the victim was sought from the Virginia State Police and the Virginia Medical Examiner's Office. The Medical Examiner's Office provided duplicate body orifice slides collected during the Williams autopsy to Forensic Science Associates (FSA) of Richmond, California, and Dr. Edward T. Blake. Washington's attorney requested that PCR based DNA typing be conducted on the relevant body orifice slides to determine whether Washington, Tinsley and/or Clifford Williams could be eliminated as the source of spermatozoa from Rebecca Williams' vagina.[8] Profiles used as standard reference samples for Rebecca Williams, Clifford Williams, Washington and Tinsley were obtained from previous DFS Certificates of Analysis and FSA Item 2, as illustrated in the summary table below which represents a synopsis of the findings described in Dr. Blake's report.

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[6] Statement of Governor Jim Gilmore Regarding the Pardon of Earl Washington, October 2, 2000, http://www.thedigitaldominion.com.

[7] *See Washington v. Buraker*, 322 F.Supp.2d 692 (W.D.Va. 2004) and *Washington v. Buraker*, 322 F.Supp.2d 702 (W.D.Va. 2004).

[8] See the April 1, 2004, redacted report by Forensic Science Associates.

FORENSIC SCIENCE ASSOCIATES REPORT DATED APRIL 1, 2004
(STR DNA Typing using Profiler Plus)

| Item # | Description | Microscopic Examination | Further Exam-ination | R. Williams | C. Williams | Washington | Tinsley | Comments |
|---|---|---|---|---|---|---|---|---|
| ME#361 [Item #1] (DFS #2004D) | Lips Slide | No sperm | No | | | | | |
| ME#361 [Item #2] (DFS #2004E) | Oral Slide | Numerous epithelial cells | Yes, used as reference sample | | | | | |
| ME#361 [Item 3] (DFS #121B) | Vaginal slide B | Numerous spermatozoa | Yes | | Eliminated | Eliminated | Cannot be eliminated | Sperm combined with Item 4 for DNA extraction |
| ME#361 [Item 4] (DFS #121D) | Labia Slide D | Moderate number of spermatozoa | Yes | | Eliminated | Eliminated | Cannot be eliminated | Sperm combined with Item 3 for DNA extraction |
| ME#361 [Item 5] (DFS #121E) | Anal Slide E | A few spermatozoa | No | | | | | |
| ME#361 [Item 6] (DFS #121 H) | Thigh Slide H | No spermatozoa | No | | | | | |
| ME#361 [Item 7] (DFS #121 I) | Buttocks slide I | No spermatozoa | No | | | | | |

Dr. Blake's report indicated that his "analysis demonstrates that Kenneth Tinsley not only shares the same genetic profile as the source of the spermatozoa from the Williams royal blue blanket #25 in area D described in the VBFS report dated October 18, 2000, he also shares the same genetic profile as the source of the spermatozoa from the Rebecca Williams vagina."

On April 28, 2004, Washington's counsel sent Governor Warner a letter requesting the appointment of "an independent auditor to conduct an audit and re-examination of a portion of the casework generated by the Commonwealth's Division of Forensic Science (DFS)," and attaching a copy of Dr. Blake's report. At the Governor's request, the DFS reviewed the matters related in the counsel's letter and initiated an internal audit of case number 81N-6691.

A Certificate of Analysis was issued dated September 30, 2004, by DFS Forensic Scientist George Li. He conducted further testing on some of the samples using a different DNA typing system. The results are summarized in the following table:[8]

DFS CERTIFICATE OF ANALYSIS DATED SEPTEMBER 30, 2004
(DNA Typing using the PowerPlex 16 BIO system)

| Item # | Description | Results | R. Williams | Comments |
|---|---|---|---|---|
| Sperm fraction extraction tube of Item 121A was combined with sperm fraction extraction tube of Item 121C | Item 121A = vaginal smear<br>Item 121C = labia smear | No amplified product was obtained | | |
| Non sperm fraction extraction tube of Item 121A was combined with the non sperm fraction extraction tube of Item 121C | Item 121A = vaginal smear<br>Item 121C = labia smear | No amplified product was obtained | | |
| Item 121A and Item 121C slides were evaluated for further testing | Item 121A = vaginal smear<br>Item 121C = labia smear | Not suitable for further testing | | |
| Item 121B and Item 121D slides were evaluated for further testing | Item 121B = vaginal smear<br>Item 121D = labia smear | Not suitable for further testing | | |
| Item 121E and Item 121F were combined for testing | Item 121E = anal smear<br>Item 121F = anal smear | No results for sperm fraction<br><br>Partial profile obtained from the non sperm Fraction | Partial profile consistent with victim | No types foreign to victim were found |
| Item 121G and Item 121H were combined for testing | Item 121G = thighs smear<br>Item 121H = thighs smear | No results for sperm Fraction<br><br>Inconclusive results for the non sperm fraction | | |
| Items 121 I and Item 121J were combined for testing | Item 121 I = buttocks smear<br>Item 121J = buttocks smear | Inconclusive results for the sperm fraction<br><br>No results for non sperm fraction | | |
| **SUBSEQUENT TESTING** | | | | |
| Sperm fraction extract of Items 121E and 121F, Items 121G and 121H, and Items 121 I and 121J were combined | Items 121E and F = anal smears<br>Items 121G and H = thighs smears<br>Items 121 I and J = buttocks smears | No typing results were obtained | | |
| Non sperm fraction extract of Items 121E and 121F, Items 121G and 121H, and Items 121 I and 121J were combined | Items 121E and F = anal smears<br>Items 121G and H = thighs smears<br>Items 121 I and J = buttocks smears | Partial profile obtained | Consistent with victim | No types foreign to victim were obtained |

[8] As in all tables, the language used is taken from the actual laboratory reports.

| | | | | |
|---|---|---|---|---|
| Items 2004A, 2004B, 2004C and 2004D | Items 2004A and B = oral smears<br>Items 2004C and D = lips smears | No analysis conducted | | |

On December 6, 2004, a memorandum was generated as a result of the internal audit conducted by two supervisory personnel from other laboratories in the Virginia system. Among the findings were:

A. Item 58, vaginal smear, Certificate of Analysis dated September 8, 2000.

1. Rebecca Williams should not have been excluded as a possible contributor to the sperm fraction of the vaginal smear, Item 58, in the September 8, 2000 Certificate of Analysis. The internal auditors feel that the major DNA profile is consistent with the victim and is the likely source of the DNA profile from the sperm fraction of the vaginal smear.

2. Kenneth Tinsley, the victim's husband and all other suspects were properly eliminated as possible donors by the examiner.

3. There was insufficient information from the other minor alleles foreign to the victim that are present in the sample to suggest another contributor.

B. Earl Washington is not the contributor of any of the DNA profiles generated in the case, and that conclusion is scientifically supported by the data in the case file.

C. Kenneth Tinsley cannot be eliminated as to the contributor of the DNA profile from the royal blue blanket (Item 25, stain D). There is no indication of the DNA profile from Kenneth Tinsley on the remaining items of evidence. These findings are scientifically supported by the data in the case file.

D. The DFS Forensic Biology protocols are sufficient for forensic casework and for this case in particular. Deviations from the DFS Forensic Biology protocol were justified in this case in the attempt to answer the question regarding the presence of Washington's DNA profile. Those deviations were:

1. Using a 33-cycle program for PowerPlex 1.1 amplification.

2. Typing samples with no DNA product as demonstrated on a product gel.

3. Reporting alleles below the HLA DQa C dot.

4. Modifying the PowerPlex amplification master mix.

E. There is no evidence of contamination in the testing of the samples in this case.

F. Factors external to the laboratory appear to have influenced the direction of the case.

1. The restriction imposed on initially consuming only half of the probative samples may have prevented the DFS from obtaining a result, or a meaningful result, for the vaginal samples.

2. There was external pressure to conduct the testing rapidly. Had more time been allotted for writing and reviewing the report, a better-suited report format might have been used that would have precluded the misinterpretation of the findings and subsequent allegations.

The DFS internal auditors concluded that the deficiencies identified in the review can be addressed through the corrective action process in accordance with DFS Quality Manual 8.2.[10] The auditors did not identify any major deficiencies as defined by DFS Quality Manual 8.3.[11] Their recommendation was that "validation testing be conducted on the best method by which to recover DNA from mounted slides."

## SCOPE OF THE ASCLD/LAB INTERIM INSPECTION

Washington's attorneys suggested in their April 28, 2004 letter to Governor Warner that the ultimate finding triggering the need for an independent inspection is the test results in the September 8, 2000 Certificate of Analysis pertaining to the sperm fraction of the DFS vaginal smear, Item 58, in that the examiner erroneously reported the presence of a DNA profile for a nonexistent male. The ASCLD/LAB inspection focused on that analysis and the analysis of Item 121A, the Medical Examiner vaginal smear.

However, the inspectors also reviewed the other examination results obtained in the DNA PCR HLA DQα and STR analyses of the evidence in order to have a complete picture of the events and analyses in this case and the analyst's technical competence. The ASCLD/LAB inspectors, in addition to making two site visits to examine the case materials, reviewed all the laboratory reports represented to exist in the case, the bench notes, the written protocols, the pertinent validation studies, the pertinent instrumentation standard operating procedures, and certain correspondence between the Governor's Office and the laboratory, counsel for Washington and the laboratory, and counsel for Washington and the Governor's Office pertaining to the examinations in this case.

Furthermore, the ASCLD/LAB inspectors reviewed related reports, and bench notes to the extent they were provided, prepared by Dr. Bing of CBR Laboratories, Inc., Dr. Erlich of Roche Molecular Systems, and Dr. Blake of Forensic Science Associates. The internal DFS audit report was also reviewed, as were Mr. Ban's comments to Dr. Blake's report and the ASCLD/LAB inspection site visits. In addition, the inspectors reviewed other collateral material, such as the Medical Examiner's testimony in the original criminal trial of Earl Washington, material in the federal civil case, and the reported court decisions in both the criminal and civil cases.

The scope of the ASCLD/LAB interim inspection was defined by seven questions posed by the ASCLD/LAB Board of Directors. Those questions, and the answers developed by the inspection team are as follows:

**1. Were the procedures used in the analyses in case number 81N-6691 generally accepted in the scientific community?**

The Virginia DFS adequately documented the protocols and procedures employed within the Central Laboratory, and based on the validation documents available to the inspection team, the methods employed in accordance with those protocols and procedures are accepted in the scientific

[10] Section 8.2 refers to the process of corrective action for minor discrepancies, which are defined, in part, as ones that "have not and will not in any way compromise the quality of work if properly addressed."
[11] Section 8.3 defines a major discrepancy, in part, as one that has "compromised the quality of the work."

community. However, the inspectors found instances of analytical deviation from stated procedures that gave rise to questionable data. In the analysis of the vaginal smear in Item 58, one of the two amplifications was performed using 33 cycles for amplification, rather than 30, the number of cycles prescribed in the DFS protocol. This deviation from protocol was not clearly noted in the case file; it was, however, noted by the internal auditors (perhaps because of their familiarity with the DFS system). When asked whether the increased cycle number was documented in their protocol, the laboratory stated it was not in their protocol and not a validated procedure. The laboratory's approved procedure, dated June 1, 1998, noted that 30 cycles was the prescribed number. A review of the PowerPlex 1.1 Technical Manual also revealed that 30 cycles was recommended. It should be noted that the erroneous elimination of the victim from the sperm cell fraction of the vaginal smear in Item 58, and the spurious profile searched in the databank, were both based on data obtained from this 33-cycle amplification. Additionally, a significant increase in the number of alleles was observed in the non-sperm fraction of the vaginal smear Item 58 following the 33-cycle set as compared to the 30-cycle set.

**2. Were the conclusions reached scientifically supported by the data in the laboratory's case file?**

The exclusion of the victim as a potential source of DNA in the sperm cell fraction of the vaginal smear from Item 58 was not supported by the data. Because of a lack of reproducibility between duplicate analyses of both the non-sperm cell and sperm cell fractions, it is unclear why the laboratory chose to rely on one set of results over the other in advancing conclusions that led to unsupported eliminations of various named suspects, including Earl Washington and Kenneth Tinsley. It should be noted that the internal DFS auditors agreed with the reported results in the September 8, 2000 Certificate of Analysis as they pertained to the exclusion of listed suspects, saying the results were scientifically supported by the data in the case file. ASCLD/LAB disagrees. The poor quality of the STR typing results and the diverse array of alleles detected for repeat analyses do not support the conclusion that the reported findings are scientifically supported by the data. In part, it is likely that poor data results were due to the quality or limited nature of the sample in conjunction with deviations from the standard protocol. Additionally, the conclusions stated in the Certificate of Analysis dated September 8, 2000 eliminating the contributor of the DNA profile from the sperm fraction of the blue blanket (Item 25, stain D) as a possible source of the genetic material in the sperm and non-sperm fractions of the vaginal smear (Item 58) are questioned since this review revealed similarities between the alleles represented in the profiles on the blanket when compared to the profiles of the vaginal smear.

**3. If there were laboratory deficiencies in this case, were they a result of a failure to follow the laboratory's protocols, or a weakness in the protocols themselves? More particularly, were there contamination issues involved in the analyses, and if so, is it possible to determine when the contamination occurred?**

As stated in the response to question 1, above, the laboratory protocols, as written, are scientifically acceptable. Although the case examiner did deviate from the laboratory's accepted amplification procedure in one amplification of Item 58, there is insufficient information to determine if the protocol deviations negatively impacted the analytical results. The obvious difference between the results of the 33-cycle amplification and the accepted 30-cycle amplification were the increase in the number of apparent alleles detected and a greater amount of background activity. Since there were no validation studies conducted on the use of 33 cycles, it is difficult to evaluate the potential ramifications of using this procedure. However, in light of the lack of reproducibility of the results obtained from Item 58, it is the ASCLD/LAB inspectors' opinion that it would have been more scientifically justified to call these results un-interpretable or inconclusive.

With regard to contamination issues, the inspectors were shown documentation of the results obtained from comparing the test results in this case with the laboratory staff DNA profile index. It does not appear that the evidence samples were contaminated by DFS personnel. Documentation of this comparison was provided to the inspectors.

There were no data in the case file examination documentation that would indicate that Deanne Dabbs had compromised the integrity of the samples she handled.

Wipe Tests were routinely used by the laboratory to monitor contamination. Files from these tests for the period from January 2000 to July 2002 were reviewed. These tests were performed on various items of equipment in the DNA analysis areas. DNA was detected in the wipe tests on several occasions, usually involving the hoods. Once detected, the units were taken out of service until cleaned and a subsequent wipe test proved negative. There is no indication that the positive wipe test results could have influenced the STR typing findings in this case.

In regard to the STR analyses, there was no indication in the case file documentation that contamination had occurred during the evaluation process. Proper controls to monitor contamination during the STR analyses were used in this case. From the data available to the inspectors, these controls did not show any evidence of contamination.

**4. Were there factors external to the laboratory that influenced the direction or results of the analyses?**

In June 2000, upon the resubmission of the vaginal smear from Item 58 and the submission of the newly found Medical Examiner smears, Item 121, Dr. Ferrara advised the analyst that he was to use only half of the sample available on Item 58 and only half of the sample available on one of the two duplicate slides of Item 121 (slides A and C, vaginal and labia smears). The DFS internal auditors cite this as a possible reason for the failure to obtain a meaningful result. The ASCLD/LAB inspectors agree with the internal DFS auditors that this decision could have impacted the test results.

In interviews with Mr. Ban, he stated that there were many personal communications taking place between himself and Dr. Ferrara. It was the analyst's recollection that they had these conversations "probably daily." The case file reflects seventeen documented conversations from June through September 2000 that indicate Dr. Ferrara was instrumental in the direction of the technical analyses. Mr. Ban indicated that the deviations from protocol were performed because of the pressure placed on him to obtain results. "Inconclusive results were not an option" according to the analyst. He went on to state that the Virginia Governor's office wanted to know whether or not Earl Washington's DNA was present in the tested samples, and he felt it important to provide them with an answer.

The suggestion that inconclusive results were not an option could have produced significant pressure on the laboratory staff to provide more definitive results than warranted. In fact the laboratory did deviate from their protocol with regard to Item 58, clearly with the intent of enhancing the prospect of obtaining a useable result.

The analyst also indicated to the inspectors that there was a great deal of pressure to issue the Certificates of Analysis in this case. This pressure may also have deprived the technical reviewer of the necessary opportunity to carefully consider the difficult analyses represented in some of the Certificates of Analysis. In an interview with Dr. Ferrara, he indicated that he was under a great

deal of pressure to provide updates to the Governor's office. Furthermore, Dr. Ferrara indicated that he provided analytical results to the Governor's office prior to those findings being published in a Certificate of Analysis.

Both Dr. Ferrara and Mr. Ban agreed that there were no outside influences suggesting that they alter their results or provide less than a complete conclusion with regard to their technical analysis.

**5. If there were laboratory deficiencies in this case, what corrective or other actions should be taken?**

As of the December 2004 ASCLD/LAB inspection, the Certificate of Analysis dated September 8, 2000, incorrectly eliminating the victim as a potential source of DNA in the sperm fraction of the vaginal smear (Item 58) had not been remediated. Dr. Ferrara and Mr. Ban stated that they were exploring mechanisms to do this, and along with the special prosecutor, had not yet formulated a plan. Other suggested corrective actions are detailed in the next section of this report.

**6. Absent erroneous applications of processes or interpretations, is it possible to reconcile the laboratory's conclusions and Dr. Edward Blake's results of the analyses on the Medical Examiner's slides?**

It is documented in the DFS case file that Mr. Ban had microscopically examined all of the slides from the Medical Examiner. On the vaginal smears, Item 121 (slides A and B), he noted the presence of "2 intact sperm & 3 heads per slide (A)" and "2 intact sperm & 2 heads per slide (B)" as well as "a lot of cellular material" on both slides. He also prepared photomicrographs of the slides. These were available for inspection by the inspectors. A low level of sperm cells was also observed on the labial smears, Item 121 (slides C and D).

The analyst performed two separate examinations on these slides; he first tested half of slide A and achieved no result from the sperm cell fraction. Next he combined the second half of slide A with all of slide C, again with no result.

When Dr. Blake performed his testing, he recorded by photograph the appearance of each slide upon receipt. The photographs record the oral smear slide of Victim Williams (Blake item 2); the vaginal smear slide (item 121B, Blake item 3); the labial smear slides (item 121D, Blake item 4); anal smear slide (item 121E, Blake item 5); thigh slide (item 121H, Blake item 6); and buttocks slide (item 121I, Blake item 7). These photographs, each containing a scale, illustrate the relative amounts of smear present on each slide. Accompanying the overview photographs were several photomicrographs recording the appearance of the smears before and after differential extraction.

For the vaginal smear slide (item 121B) the photographs revealed the relative amount of smear to be appreciable for this sample indicating varying density of the material over a relatively large area of the slide surface. The three photomicrographs taken prior to differential extraction record three separate areas on the smear, each with at least three sperm heads. The sperm are visible among much higher concentrations of nucleated cells. The post-digest slide represented by three photomicrographs reveal that the nucleated cells were digested revealing sperm heads ranging in number from three to five per area recorded. Similar observations were possible from the photographs of the labia smear slide (item 121D). Since the areas recorded by Dr. Blake represent only small portions of the smears present, it is expected that spermatozoa would have been present in other areas on the slides. These findings are not consistent with Mr. Ban's observations of 2 intact sperm and 2 or 3 heads per slide.

In conjunction with this review, copies of the Profiler Plus STR typing data for the analyses conducted by Dr. Blake were also reviewed. The electropherograms represented the Genotyper data for various smear extracts and the combined vaginal/labial slide sperm fraction (the vaginal and labial differential extract fractions were combined for the STR typing). The profiles indicate a good differential extraction of the sperm cell DNA from the nucleated cell material illustrated by a single source male profile in the sperm fraction. Consequently Dr. Blake was able to obtain clear and definitive results. Dr. Blake's quantitation data indicate that sufficient DNA was obtained from the combined sperm fraction of the two slides for several amplification reactions. The DNA obtained may be degraded as evidenced in the resulting profile. Even though the DFS worked with two different slides, the discrepancy in the amount of DNA obtained indicates that the sample should not have been divided and that the DNA extraction procedure used by DFS was not effective.

**7. Are there any other factors relevant to this case that should be considered?**

During the inspection process, one statement was repeated a number of times by Mr. Ban, Mr. Sigel and Dr. Ferrara: this case was being worked at the direction of the Governor and was not a normal law enforcement type of case. The Certificates of Analysis were issued as "Governor's Working Papers" and were not intended for general dissemination. Many of the apparent shortcomings were explained as a result of this not being a "normal" case. There were no written policies or procedures that identified the differences between this case and a "normal" case.

## ASCLD/LAB LIMITED SCOPE INTERIM INSPECTION FINDINGS

The ASCLD/LAB inspectors agree in part and disagree in part with the observations by both the DFS internal auditors and Dr. Blake. The ASCLD/LAB inspectors conclude that:

1. With regard to the STR typing, there appear to have been deviations in protocol in conjunction with marginal sample quality that led to examination data that, in the ASCLD/LAB inspectors' opinion, should not have been relied upon by the DFS. The poor quality of the DNA typing results and the diverse array of alleles detected which lacked reproducibility, by repeat analysis, do not support the conclusion that the reported findings are scientifically supported by the data.

2. The analyst's reported conclusions in the September 8, 2000 Certificate of Analysis with regard to the sperm fraction of Item 58 vaginal smear are incorrect. The victim should not have been excluded, and no opinion should have been rendered as to the possible contributions of the husband, Tinsley or the other suspects, for the same reasons expressed in item 1 above.

3. There is no data indicating that contamination was introduced during the PCR testing.

4. It appears that the process used to recover the biological material in the smear from the slide identified as Item 121A may not have allowed the genetic material to be released for differential extraction.

5. At the time of the analysis, the PowerPlex amplification system did not type the amelogenin locus, which would have provided DFS examiners with significant information

about the relative contributions of male and female DNA in the evidence samples against which to evaluate typing results.

6. Pressures from outside the laboratory and excessive managerial influence from within the laboratory during the STR analyses phase had a detrimental affect on the analyst's decisions, examinations and reports in this case.[12]

7. In addition to the failures noted with respect to the examiner in regard to policy and procedure, the technical reviewer did not observe the errors in the processes and the reported results.

In light of deviations in protocol transcending a number of the examinations in this case, several recommendations are made to ensure that faulty results have not occurred in other cases handled by this examiner, that the root causes of the failures in this case are not systemic, and that all causes of the failures will be corrected.

The recommended corrective actions and protective measures are as follows:

1. Conduct validation studies on the extraction procedures of DNA from mounted slides.

2. Define a process to insulate the examiners from pressures that may be applied from inside and outside of the laboratory in situations similar to this case.

3. Refine the technical review process to ensure that policies and protocols are followed and that conclusions are scientifically supported by the data in the case.

4. Institute a policy by which deviations from standard operating procedures are approved in advance and documented in the case file.

5. Formulate a process to be used to develop an analytical approach when working with DNA samples having a low level of genetic material and for evaluating allelic dropout.

6. Ensure that the laboratory's Quality Manager determines whether the deficiencies revealed in this report are endemic to the DNA operations throughout the laboratory system in Virginia. This should be accomplished in part by a thorough examination of a minimum of 50 cases in the Virginia system dealing with low level DNA and/or slides prepared in a manner similar to Item 121A to determine whether process errors occurred and whether conclusions are scientifically supported.

   The Quality Manager should convene a suitable number of qualified DNA analysts, supervisors or technical leaders, internal and external to the laboratory or laboratory system, to determine whether the selected cases have deficiencies that substantially affect the integrity of the results in those cases. For purposes of this review, low level DNA casework is defined as recovering amounts of DNA near the detection limitations of the analysis system in use. ASCLD/LAB further recommends that the DFS prepare a report at the conclusion of this review to be provided to ASCLD/LAB for further recommendations as appropriate.

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[12] It is clear that the pressures on the examiner were to obtain a result and conclude the case, not to obtain a specific result.

7. Implement appropriate corrective actions with respect to the analyst in this case. Among the corrective actions the laboratory should consider are the following:

a. Discontinue the analyst's casework involving low level DNA samples and/or mounted slides until the corrective actions are completed.

b. Conduct a review of the analyst's casework, using internal and external reviewers, from cases in and around 2000 and forward, particularly in cases in which there were low level DNA and/or mounted slides, to determine if the conclusions are scientifically supported by the data.

c. Discontinue the analyst's responsibilities as a Technical Leader until the corrective actions are completed.

8. Encourage participation by the analyst in this case in the corrective actions described in paragraphs one through five, above.

## CONCLUSION

The inspection team reviewed numerous pages of case file documentation, supporting materials, and other pertinent information. It was not possible to adequately review each of the allele calls for the typing gels. A complete and thorough review of the STR typing gels would be necessary to determine which of the allele assignments are correct, especially when one considers the variation in the alleles noted for repeat analyses. However, there were sufficient data available to conclude that the DNA typing results offered in this case should have, at best, been reported as inconclusive, rather than attempting to make an interpretation from poor quality information. The added daily pressures to produce a result during the STR typing analyses laid the groundwork for mistakes to be made and procedures to be modified in attempts to gather some useful information.

Ralph M. Keaton
Ralph Keaton, Director, ASCLD/LAB

Date: April 18, 2005

## APPENDIX I

## ANALYTICAL OBSERVATIONS OF THE ASCLD/LAB INSPECTORS

The following analytical observations by the inspection team are based on the review of the case file documentation and Certificates of Analysis, supplemented by other relevant material, beginning with the initial evidence assessment in 1982 through 2004.

**Initial Evidence Evaluations:**

The original evidence assessment in 1982 by Forensic Scientist Deanne Dabbs provided the most informative evaluation of the items that would be subsequently tested with DNA technology. This included the documentation and preliminary testing of the stains, identification of spermatozoa and the numbers observed

**HLA DQ-α Testing:**

1. In the Certificate of Analysis dated August 31, 1993, Forensic Scientist Jeffrey D. Ban reported the DQ-α DNA types as follows:

| | HLA DQ-α Type |
|---|---|
| Item 48 Known blood sample from Rebecca Williams | 4,4 |
| Item 58 Vaginal swab | |
| Non-sperm fraction | Inconclusive |
| Sperm fraction | 1.1,1.2,4 |
| Item 59 Known blood sample from Clifford Williams | 4,4 |

A. Upon review of the PCR-DQα worksheet dated 8/11/93 it was observed that for this typing set the extraction/reagent blanks were not included. Although the blanks were used from the extraction phase of the analysis, they were not examined in the actual typing. This is inconsistent with the laboratory's HLA DQ-α Protocol, 13.1.1 Extraction Controls, which states that the Reagent Blanks are to be taken through the entire extraction, amplification and typing procedures.

B. In comparing the typing strip dot intensities to the noted and reported conclusions, the inspectors find the reporting of the 1.2 allele in the mixture depicted on the strips to be questionable. For the *sperm* fraction there were two typing results, since this fraction was typed using 8μl and 4μl of DNA extract. The allele dot profiles for the two samples were in agreement and represented a 1.1,4 pattern with the 1 and 1.1 dots greater in intensity than the control dot (C dot) and the 1 dot greater than the 4 allele dot. At issue is the reporting of the 1.2 as a discrete allele. Although the presence of the 1.2 cannot be eliminated, the design of the dot blot strips did not include a separate dot designation for the 1.2 allele, which made a conclusive statement of its presence difficult in mixture combinations with certain other alleles.

C. The *non-sperm* fraction for the vaginal swab Item 58 was also typed using the 8μl and 4μl of extracted DNA. The results for these samples were reported as "inconclusive." The dot patterns represented on the two strips depicted a mixture of alleles in varying amounts with the C dot clearly visible on both. There was no explanation as to why these findings were considered inconclusive when the C dot was present, even though the mixture of alleles was complex.

D. An evaluation of the differences observed between the alleles detected in the *sperm* and *non-sperm* fractions of Item 58 was not possible since there was no documentation that an assessment of the relative concentration of the expected cellular components, nucleated epithelial cells and spermatozoa, was performed. The 1982 observations by Ms. Dubbs that spermatozoa were present were the only comments available. A review of the laboratory's extraction protocol "Organic Procedures for Other Body Fluid Stains" does not specifically call for a microscopic evaluation of the cellular components during the various stages of the differential extraction procedure. However, in section 4.2.6.9, it states "repeat wash step an additional 1 to 2 times. Note: Additional wash steps are

recommended when the ratio of sperm to epithelial cells may be low." It would be very difficult to determine this ratio without a microscopic evaluation of the extracted material's cellular composition.

2. In the Certificate of Analysis dated January 14, 1994, Mr. Ban reported the DQ-α DNA types as follows:

| | | HLA DQ-α Type |
|---|---|---|
| Item 25 Blue blanket, Stain A | | |
| | Non-sperm fraction | 1.1,4, (2) 1.3* |
| | Sperm fraction | 1.1,4 |
| Item 25 Blue blanket, Stain B | | |
| | Non-sperm fraction | 1.1,4, (2) 1.3* |
| | Sperm fraction | 1.1,4 |
| Item 25 Blue blanket, Stain C | | |
| | Non-sperm fraction | 1.1,4, (2) (1.3) |
| | Sperm fraction | 1.1,4, (2) |
| Item 25 Blue blanket, Stain D | | |
| | Non-sperm fraction | 1.1,1.2,4, (2) |
| | Sperm fraction | 1.1,1.2,4* |
| Item 50 James Pendleton's standard | | 4,4 |

Number in ( ) indicates a weak allele (equal to or more intense than C dot)
* indicates a very weak allele (less intense than C dot) included for informational purposes only.

A. The HLA DQ-α results reported in the Certificate of Analysis identify the genotype for James Pendleton as a 4,4. The table of typing results for the analysis set noted the presence of a weak 1.1 allele. This observation is recorded as 4,4 1.1* which is consistent with the explanation in the clarification to the report above. Upon review of the typing strip photographs, the 1 and 1.1 dots are visible and less intense than the C dot and much less intense than the 4 allele. There is no explanation for not including the presence of this minor component in the final report when similar weak allele findings were reported for the stained samples.

B. A Product Gel Data Worksheet dated 1/13/94, listed the above reported samples in the order of sampling on the electrophoresis gel. An accompanying photograph depicted the relative fluorescence of the various samples and controls. There were no analyst observations noted next to each sample, however, a review of the photograph revealed amplified product in the question samples and the reference sample Item #50. At issue is the negative amplification control that was observed to have distinct fluorescent activity. The negative amplification control is intended as a means of evaluating potential contamination of the amplification materials as it is incorporated at the amplification setup stage. In addition, both the BB (blood blank) and BM (blank mix) reagent blank controls appeared to have very weak fluorescent activity. There were no notes by the analyst of having observed this incidence or explanation of its significance or corrective actions. The HLA DQ-α

typing strips for these samples did not reveal any visible dot activity. Of concern is whether the weak additional dots observed for the reference sample Item 50 represented contamination.

**Short Tandem Repeat Analysis:**

1. In the Certificate of Analysis dated September 8, 2000, Mr. Ban reported the following STR PowerPlex typing results:

> The evidence items from which DNA was recovered were the vaginal and labial smears from the Medical Examiner's Office (Item 121A and C), vaginal smear (Item 58), blanket (Item 25 stains A, B, D and 1-5), fingernail scrapings from victim Rebecca Williams (Items 55 and 56), a shirt (Item 72) and the reference blood samples from Rebecca Williams (Item 48), Clifford Williams (Item 59C) and Earl Washington (Item 120). The DNA recovered from the labial smear (Item 121C) was reported as insufficient in quantity.
>
> The vaginal smear (Item 121A), blanket (Item 25 stains A, B and 1-5), fingernail scrapings from the victim (Items 55 and 56) and the shirt (Item 72) were amplified and typed in the PowerPlex 1.1 STR system.
>
> The vaginal smear (Item 58), the blanket (Item 25 stain D), and the three reference blood samples were amplified and typed in the PowerPlex 1.1 and 2.1 STR systems.

A. The results of the STR DNA typing of the fingernail scrapings (Item 55 and 56) concluded that a mixture was present with Rebecca Williams being the major contributor. No conclusion relevant to the minor contributor was offered due to the limited DNA profile.

(1.) Upon review of the Certificate of Analysis relative to the fingernail scraping evidence, it was observed that the STR DNA typing results were absent from the STR findings listed in the Table of PowerPlex Typing Results. The "Results" section of the report refers to the table for the typing results of these as well as other items. When Mr. Ban was queried about this omission and why a corrected report was not issued upon its discovery, his response was that the report was not intended for the usual law enforcement agencies and therefore it was not considered necessary.

The DFS Policy and Procedure Guide 2-3, dated October 17, 1997, addresses Certificate of Analysis preparation, including reissuing of reports needing change (Section 4.10).

<u>Corrective Action</u>:

Upon the return of the inspection team to Virginia Division of Forensic Science in December 2004, additional documentation was provided which included a Memorandum of Record dated 10/5/04 noting a request from Rick Moore, Deputy Commonwealth Attorney, that a supplemental

Certificate of Analysis with the results for the fingernails (Items 55 and 56) be issued. A letter on Virginia Division of Forensic Science letterhead signed by Jeffrey D. Ban to Richard E. Moore, Deputy Commonwealth's Attorney, dated November 2, 2004, was included. This letter clarified the omission and included the Table of PowerPlex 1.1 Typing Results.

(2.) The Slot Blot DNA Quantitation worksheet dated 7/20/00 depicts the sample and control layout on the membrane and the results obtained. It was noted that for column 4 the word "empty" was written above a bracket which spanned from well A at the top of the worksheet to well H at the bottom. This indicated that for this analysis there were no samples applied to this column of wells. Upon inspection of the actual slot blot film, a clearly visible band was present in well 4A, which had no notations indicating that a sample had been applied. There were no notes on the worksheet reflecting that the analyst had observed this band.

(3.) With regard to the STR typing of the fingernail scrapings, there are alleles in the table of typing results for 8 loci. Three loci had ( ) around the listed alleles indicating weaker or questionable results. A note at the bottom of this page stated "not second sized." There is no indication in the analytical notes for this specific analysis that an independent calling of the alleles for each sample had been conducted by a second qualified individual, as required in section 9.2.7A of the Biology Section Procedure Manual, Section III, memorandum Number 17.

(4.) The fourth paragraph of the conclusion section of the Certificate of Analysis (9/08/00), page 6 of 8, states that "No DNA profile was obtained for the sperm fraction of the vaginal smear from the Medical Examiner's Office (ME) (item 121A). Therefore, no conclusion can be made about the sperm fraction for this sample."

The reasons for not recovering sufficient DNA to determine a profile for this sample may be the result of a lack of sufficient original smear or possibly problems with the recovery of biological material from the slide. This could include, but is not limited to, problems with the differential extraction itself. There are lots of steps in the sequence of analysis where the work could have gone off track, starting with getting the material off the slide itself in an efficient way. A review of the case notes related to the handling and extraction of the Medical Examiner's smears revealed that there were photographs taken by the analyst prior to extraction of the vaginal smear Item 121A. The photomicrographs were labeled Vaginal Slide "A" (5 black and whites of the same area on the slide), Vaginal Slide "B" (1 color), Labia Slide "C" (1 color), and Labia Slide "D" (2 black and white) relating to the vaginal and labial smears. The photomicrographs were apparently documentation of the gross smear slide content since each photograph represented areas containing several nucleated cells with one or two likely spermatozoa visible in the open areas of the slides. There also appeared to be a few more spermatozoa among the nucleated cells.

Mr. Ban's case notes dated 6/5/00 reflected the following observations relative to the microscopic examination of the smear slides; all smear slides had been previously stained and contained cover slips:

121A – Vaginal Smear: "A lot of cellular material observed, 2 intact sperm & 3 heads per slide."

121B – Vaginal Smear: "A lot of cellular material observed, 2 intact sperm & 2 heads per slide."

121C – Labia Smear: "Some cellular material observed on slide, 2 heads & 1 intact sperm per slide."

121D – Labia Smear: "Some cellular material observed 2 intact sperm & 2 heads/sweep."

121E – Anal Smear: "A small amount of cellular material, 1 possible intact sperm mixed w/ cellular material??"

121F – Anal Smear: "A small amount of cellular material, 2 heads, and no intact sperm observed."

Examination date 6/6/00.

121G – Thighs smear: "Very little cellular material observed, poss. 2 heads per slide, not well defined."

121H – Thighs smear: "Very little cellular material observed, 1 possible sperm observed on top of epith. Cell ?? not well defined in order to take a photo."

121I – Buttocks smear: "Very little cellular material observed, no sperm head were found."

121J – Buttocks smear: "Very little cellular material observed, 1 poss. Sperm head observed, not well defined."

There were no other notes available to help in determining a reason for the failure to obtain a DNA profile from the *sperm* fraction of Item 121A in the first differential extraction dated 6/14/00. The product gel revealed no product bands for the *sperm* fraction extract. No STR profile was reported for the *sperm* fraction. The case file documentation relevant to this sample was evaluated to assist in identifying possible reasons for not achieving a reportable STR DNA profile. From the initial microscopic examinations, there were spermatozoa observed on the smear slide, 2 intact sperm & 3 heads per slide. However, there was no other information present that could provide an explanation for the lack of sperm DNA recovery. Possible reasons for this lack of recovery are a small amount of smear material to begin with (no notes were located describing the size or amount of the smears on each slide); difficulty in physically removing the cellular material from the slides for extraction; problems with the extraction

procedure, or sample handling during analysis. Another possibility, that could have affected the recovery, was the requirement on the analyst to consume only half of the available smear; a decision made in consultation with DFS Director Paul Ferrara. After the initial lack of sufficient recovery, permission was given to consume the remaining smear in an attempt to recover enough DNA for STR typing.

A second differential extraction was performed on 6/20/00. This extraction combined the remaining half of the ME vaginal slide (Item 121A) and the entire ME labia slide (Item 121C). Slot blot results reflected no DNA product for the sperm fraction of this combined sample extract. The product gel revealed a very weak banding pattern for both the non-sperm and sperm fractions. The typing gel was not sized as the following note recorded "image not sized carryover of ladder." Samples were reamplified on 6/24/00/ with the product gel revealing no product. The samples were typed but a note explained "image not sized no useable information could be obtained." As with the first extraction set, it was not possible to determine a reason for the lack of detectable DNA as there were no notes available for review that could provide information on the effectiveness of the analysis.

Information acquired during this investigation from DFS staff indicates that the type of smear slides prepared by the Medical Examiner's Office was not common. Each of the slides was stained and had a cover slip. Mr. Ban explained his difficulty in removing the sample from the slides as swabbing was not effective and he had to resort to scraping to affect a recovery.

B. The sixth paragraph of the conclusion section in the Certificate of Analysis (9/8/00), page 6 of 8, states that "The DNA profile obtained from the *sperm* fraction of the vaginal smear (item 58) at," various noted loci, "is consistent with a mixture. Rebecca Williams (item 48), Clifford Williams (item 59C), and Earl Washington (item 120) are eliminated as possible contributors of genetic material to this mixture."

(1.) At issue is the statement that the victim is eliminated as a possible contributor of the genetic material for the *sperm* fraction of the vaginal smear (Item 58). A review of the STR typing data revealed that there were results from two typing gels compiled in tables. In the first set of results, which were not reported, a profile for several loci were noted. For the eight PowerPlex 1.1 loci tested, five were represented by two alleles, both of which agreed with the victim's profile. The other three loci were noted as providing no results. The PowerPlex 2.1 findings revealed the same allelic combinations for the *sperm* fraction and the victim's profile for the three loci reported.

The second set of typing results, which were reported, revealed a slightly different profile for some of the loci when compared to the first analysis. Some of the loci were represented by one allele where two had been observed in the first analysis. There were a couple of additional alleles, foreign to the victim's profile, also detected.

Rather than attempt to reinterpret all of the typing gel data, the inspectors focused on the laboratory's reported findings and also those noted in the case file documentation.

The data recorded for the two typing sets revealed that they lacked reproducibility. Based on this review, and the lack of reproducibility between duplicate analyses of this *sperm* fraction, it would not be possible to conclusively exclude the victim as a probable contributor to at least some of the DNA detected in this sample. The lack of sample assessment information makes any further evaluations difficult, since it cannot be concluded with certainty that spermatozoa were present in the *sperm* fraction after the initial smear slide microscopic observations, sample removal, and differential extraction. Having information about the relative concentration of epithelial cells to sperm cells could provide one more bit of data that would aid in interpreting whether the DNA profile detected was consistent with residual DNA from the female contribution, because of a high epithelia cell concentration, or more representative of the male sperm contributor. It would not be uncommon for there to be carryover of female DNA from the epithelial cells into the male or *sperm* fraction with the relative amounts of each expressed in the typing results dependent on such factors as the condition and amount of the original sample, the relative cell component concentrations, as well as the effectiveness of the differential extraction procedure.

The STR typing profiles for the two analysis sets are not reproducible; however, the information represented by the alleles detected for the various loci does indicate a consistency with the victim's profile to some extent. The inspectors believe that this consistency is sufficient to conclude that the victim cannot be eliminated as a possible contributor to the genetic material in the mixture.

When duplicate analyses of a sample produces results that are not reproducible, a conclusion more consistent with "no interpretable results obtained" or one that simply states the findings were "inconclusive" would be more appropriate.

During the December 2004 revisit, a discussion was had with Mr. Ban regarding reporting an inconclusive result that lacked reproducibility. His reply was that reporting an "inconclusive was not an option" in this case. The Governor's office, according to Mr. Ban, wanted to know if suspect Washington was cleared of the charges.

An internal audit report was provided during the December 2004 interim inspection. The review of the case file was conducted by two supervisory personnel from two other Virginia DFS laboratories. A memorandum dated December 6, 2004, was issued by the internal auditors and is discussed at the end of this report. In this memorandum, the internal auditors conclude that the victim should not have been eliminated as a potential source of DNA in this sample. Through oral communication with Mr. Ban, Virginia DFS Deputy Director Steve Sigel and Dr. Ferrara, the

inspectors have been informed that an effort will be made to correct the reported elimination. As of the conclusion of the December 2004 on-site interim inspection, the mechanism they will use to make this correction had not been decided.

2. In the Certificate of Analysis dated 10/18/00, Mr. Ban reported the STR PowerPlex typing results.

   A. The first issue noted from the report is in regards to the conclusions that Kenneth Tinsley and seven other male subjects were eliminated as possible contributors of genetic material to the mixture of DNA obtained for the *non-sperm* fraction of the vaginal smear (Item 58). See page 4 of 5 of the Certificate of Analysis. A similar issue of elimination is apparent in the conclusions offered on page 7 of 8, C of A 9/8/00, for the DNA profile of the contributor of the sperm and non-sperm fractions of the royal blue blanket (Item 25, stain D). In part the last sentence of the sixth paragraph states that "this individual (the contributor of the DNA profile for the sperm fraction of Item 25, stain D) is eliminated as a possible contributor of the genetic material found in the non-sperm fraction of the vaginal smear from the Medical Examiner's Office (Item 121A), and the sperm and non-sperm fraction of the vaginal smear (Item 58)."

   A review of the case file documentation revealed that, as with the *sperm* fraction, there were two analyses resulting in STR typing information; one was reported and the other was not. The first conclusion upon evaluation of the data was that the two results were not reproducible. The profiles noted in the data tables indicated a complex DNA mixture. There were a number of alleles noted; some conclusively, and some with ( ) around them to indicate alleles detected were of lesser intensity. Not all of the seven reference DNA profiles from the other subjects were compared extensively by the inspectors to the reported *non-sperm* fraction profile obtained from Item 58. However, suspect Kenneth Tinsley was compared to the reported profile as well as the unreported data. The STR profile of Tinsley revealed overlapping of alleles for several loci with the profile of Rebecca Williams. Taking into consideration the lack of reproducibility between the two analysis sets, it was decided to look at all detected or noted alleles for each locus. Furthermore, the age and condition of the evidence sample indicated that some of the sperm contributors' DNA would be expected in the *non sperm* fraction. With this in mind, the review concluded that the alleles detected in one or both of the two *non sperm* fractions were shared by Kenneth Tinsley in all but two loci for which data was reflected. In the D8S1179 locus, Kenneth Tinsley is reported to be a 13,16 genotype, while there was no 16 allele detected in the *non sperm* fraction. For D18S51, Tinsley is reported to be a 12,18 and there was no 18 allele represented in the question sample profile.

   Excluding a subject based on the absence of an allele at one or more loci is a common conclusion offered in this type of analysis. Consideration should be given when making these interpretations to the quality and quantity of the evidence being evaluated and the reproducibility of the test results. In light of the low amount of DNA recovered and the difficulty in achieving a profile, let alone a reproducible profile, making a conclusive determination of exclusion based on the data represented would be unjustified.

Based on the lack of reproducibility of the two test results and the spectrum of alleles detected, eliminating Kenneth Tinsley conclusively as a possible contributor is not supportable based on the data obtained in this case even considering that his profile contained two alleles that were not observed in the non-sperm fraction.

The poor quality of the DNA STR typing results achieved for the *sperm* and *non sperm* fractions of the vaginal smear, Item 58, makes a definitive statement about the inclusion or exclusion of a subject questionable.

## APPENDIX II

**Virginia Division of Forensic Science Internal Audit Memorandum:**

The laboratory is to be commended on initiating the internal audit conducted by Karen C. Ambrozy and R. Elizabeth Bush reported in a Memorandum dated December 6, 2004. Some of the issues identified by the auditors were useful in giving direction to evaluating the deviations from the accepted protocols. The four deviations noted were for the most part discussed in the preceding pages with the exception of the last, which referred to "modifying the amplification master mix." This situation was identified in the analysis conducted and reported by Forensic Scientist George Li on items listed in the Certificate of Analysis dated 9/30/04. The analyst replaced the volume of water in the master mix for the "case samples". The modification was approved by Mr. Ban in his role as Technical Leader of the DFS Laboratory. There was no amplified product obtained and no typing conducted.

The deviation noted in regards to "typing samples with no DNA product as demonstrated on a product gel," relates to policy that was revised in memorandum to "All Forensic Biology Staff" on December 3, 1999, which changed portions of the DFS Forensic Biology Section Procedure Manual, Section III, 6.5.9.2. The revision reads "If NO amplified DNA is observed on the product gel and no DNA was observed on the lumigraph/x-ray film, no further analysis will be conducted on this sample." The first incident was observed on a product gel worksheet dated 6/17/00 where two samples, Rebecca Williams and the sperm fraction for the vaginal slide 'A' 121A were present. The second occurrence was for sperm and non sperm fractions for vaginal/labia smear Items 121 A&C on a product gel worksheet dated 6/25/00. Both samples were noted as having NO product.

The ASCLD/LAB inspectors disagree with the statement made by the DFS internal auditors that "We find that the conclusions reached in this case regarding Earl Washington and Kenneth Tinsley are scientifically supported by the data in the case file." The poor quality of the DNA typing results and the diverse array of alleles detected by repeat analyses, that are not reproducible, do not sustain the conclusion that the reported findings are scientifically supported by the data.

# Appendix 2:

## Additional Material for the Record

**National District Attorneys Association**
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March 9, 2009

U.S. House of Representatives
Subcommittee on Technology and Innovations
Committee on Science and Technology
2318 Rayburn House Office Building
Washington, D.C. 20515

RE: *National Academies of Science Report: Strengthening Forensic Science in the United States: A Path Forward Hearing March 10, 2009*

Dear Subcommittee Chairman Representative Wu and Subcommittee members:

The National District Attorneys Association (NDAA), an association representing state and local prosecutors, supports many of the recommendations cited in the recent National Academy of Sciences (NAS) report: *Strengthening Forensic Sciences in the United States: A Path Forward*, specifically those addressing the need for forensic research, establishing uniform standards and methodologies within the each of the various forensic disciplines and laboratory accreditation. Establishing these base-line requirements will enhance the correct use of forensic evidence by criminal and civil justice practitioners' and promote public confidence in the reliability of forensic evidence admitted in legal proceedings. By requiring that uniform standards are met by **all** parties offering forensic evidence in a legal proceeding, the value and reliability that such evidence provides will, in turn, promote the identification and conviction of the guilty and the exclusion of the innocent.

The numerous types of forensic evidence frequently seen in legal proceedings grew out of various methodologies and over time. As such, these methodologies have been scrutinized through many levels of peer review and the resulting evidence subject to the various legal challenges found in *Frye v. United States* ( 54 App. D.C. 46, 293 F. 1013 (1923)), and *Daubert v. Merrell Dow Pharm., Inc.* 509 U.S. 579 (1993). Allocating funding for additional research will provide an even greater level of documentation and confidence regarding the use of forensic evidence. In the interim, however, the size of a particular discipline's catalog of supporting research does not alter the reality that forensic evidence assists law enforcement in focusing investigations and assists legal practitioners in identifying and excluding parties in criminal or civil proceeding.

NDAA does have some concerns regarding the report's heavy reliance on issues which arose before application of the more stringent *Daubert* test or before laboratory accreditation became as widespread as it accurately is today. Additionally, there is a need for further impartial analysis rather than the report's almost exclusive dependence on the Innocence Project and progenys' analysis of the state of forensic science before appropriate, impartial and scientific corrective measures can be implemented.

The NAS report identified approximately 175 publicly funded forensic laboratories and three states as requiring mandatory accreditation for publicly funded laboratories. Alternatively, Peter Marone, Director of Technical Services at the Virginia Department of Forensic Science and one of the authors of the report, has suggested this number is closer to 400 publicly funded laboratories. Kenneth Melson, Director, U.S. Department of Justice, Executive Office of the United States Attorneys, has suggested that approximately 90% of the publicly funded laboratories are accredited. In order for a forensic laboratory to be accredited, it must demonstrate that its policies, procedures and testing methodologies follow the standards established by the accrediting organization.

While most forensic evidence offered by a federal, state or local prosecutor is tested at an accredited laboratory, the forensic evidence offered by a defendant in a criminal proceeding is often the product of unaccredited laboratory testing. Additionally, forensic analysts associated with an accredited forensic laboratory routinely undergo rigorous proficiency testing whereas a similar showing of proficiency does not extend to analysts in unaccredited laboratories. Ironically, the Innocence Project routinely seeks the services of unaccredited laboratories.

Within the scope of the report recommendations considered by the House Subcommittee, the NDAA supports measures to increase research, the application of uniform standards with a particular forensic discipline (although the uniformity of these standards may not be relevant to all disciplines) and laboratory accreditation as a requirement for evidence submission by **all** proponents of the proffered forensic evidence.

Members of the National District Attorneys Association will be happy to discuss the contents of this letter with members of the Subcommittee.

Sincerely,

Joseph I. Cassilly
President