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The Right Path?

by The Honorable Jan Scully (Sacramento County District Attorney), The Honorable Ed Jagels (Kern County District Attorney), and The Honorable Dolores Carr (Santa Clara County District Attorney)

The National Academy of Sciences (NAS) in its February 2009 report, *Strengthening Forensic Science in the United States: A Path Forward*, makes a number of recommendations with the stated intent of advancing forensic science. Unfortunately, what has been touted as a path forward is anything but. These recommendations would dismantle and disrupt forensic laboratories, waste billions of dollars on unnecessary and duplicative efforts, ignore programs that improve the reliability of forensic science, and, ultimately, lead us down the wrong path.

Some of the recommendations, such as calling for the establishment of standard terminology or seeking to fund peer-reviewed research, clearly have potential to further the use and understanding of forensic science. However, two of the key recommendations do nothing to advance the discipline. At best, they propose a universal and costly solution to an isolated problem. At worst, they propose a huge waste of public funds that will deliver no tangible improvements and will not make our communities safer—in fact, they will make it less likely that offenders will be brought to justice. The recommendations to which we refer are:

1. The creation of an independent federal entity—the National Institute of Forensic Science—to oversee the forensic community.
2. The removal of all public forensic laboratories and facilities within state and local jurisdictions from the administrative control of law enforcement agencies or prosecutors' offices.

The creation of another federal bureaucracy is disturbing on many levels,

not the least of which is the waste of resources by ignoring or abandoning the work of successful, existing programs and organizations. It also means spending millions of dollars in the creation of a national solution where a national problem has not been shown to exist. However, the more disturbing of the two recommendations is the one to remove public forensic laboratories from law enforcement oversight.

With government at all levels bleeding dollars and eliminating jobs, one of the most obvious concerns is financial. While at first blush it may appear an easy task to change the administrative control of forensic laboratories, costs go well beyond transferring the duties of one entity to the oversight of another. What do you do with all the criminalists and laboratory personnel who are employed by the law enforcement agency? What do you do with the facilities owned by the existing entity? Will every law enforcement agency voluntarily surrender building space, equipment, and the like? How do you handle the union agreements that outline the rights and obligations of the employers and employees? Where do you get the money to hire and train the new team of administrators, support staff, and, if necessary, criminalists to build and furnish any new facilities, compensate for what happens to any old facilities, and so on? Imagine this scenario being replayed hundreds of times across the nation.

To tear down the many on-going, efficient organizations that are answerable to the public through the courts and the elected government officials who represent the funding source—organizations that have historically produced reliable results—just to replace them with what will prove to be a bottomless money pit borders on the absurd. And if the

goal is to remove forensic laboratories from the administrative control of law enforcement, once the state, county, and city laboratories are dismantled or “re-invented,” can the most influential forensic laboratories in the country, those of the Federal Bureau of Investigation, be far behind? The result—years and millions of dollars in the making, and a committee of 52 to tear it apart.

This billion-dollar game of musical chairs is premised on the conjecture that, nationwide, law enforcement officials are somehow routinely and uniformly tainting the findings of the forensic laboratories under their administrative control. Where is the evidence of this pandemic forensic problem?

The NAS cites significant problems with two crime labs (in West Virginia and Houston). But these represent only about one-half of one percent of the 389 public crime labs. Similarly, referencing fingerprint analysis, the report mentions a single FBI case where, using a faxed copy of a latent print, the FBI made an identification that later proved erroneous when the original latent was used; and a single trial judge in Maryland who restricted fingerprint evidence, ignoring the thousands of cases annually where fingerprint evidence has been performed reliably, and the hundreds if not thousands of cases where the evidence was admitted in court without restriction, and the cases have been affirmed.

The NAS report also cites Innocence Project DNA exonerations, which totaled 223 by November 2008, with 60 percent said to have involved faulty forensic science in the first instance—in other words, 134 cases nationwide, in a search for innocent persons that reviews cases going back more than two decades. No one in or out of law enforcement has an interest in seeing innocent persons

convicted. But when one looks at reasons for making nationwide changes in the delivery of forensic services, the Innocence Project numbers must be kept in context.

Figures in the NAS report speak to the volume of forensic lab cases nationwide—3,980 analysis requests completed by the average lab in one year, multiplied by 389 public labs, yields a figure of more than 1.5 million per year. The report states that for just the field of DNA analysis, hundreds of thousands of DNA cases are processed annually by 175 public and 30 private labs. Such annual projections seem consistent with national figures on criminal convictions (i.e., in 2004, nationwide there were 1.1 million felony convictions; conservatively, including misdemeanors, that would mean at least three million convictions in a single year). Clearly, over a 10-year span, forensic labs have processed millions of cases. Thus, when measured against just a decade (their work actually reviews cases extending back far longer), Innocence Project exonerations with faulty forensic science account for fewer than 1/100,000 of all laboratory cases.

The isolated cases of faulty forensic results that have been cited are not typical, and they do not make a sound basis for abandoning what has been, overall, a proven, reliable system and impeaching the hundreds of thousands of cases that are analyzed correctly by state and local forensic laboratories every year. When isolated instances arise of criminal convictions being reversed in state courts, do we embark on a costly reorganization of the court systems in each of the 50 states? The proposal is a classic case of throwing out the baby with the bath water.

An additional factor—related to the issues of expense, and not to be ignored—is the issue of budgeting processes. Under the system in place in most states today, the forensics laboratory is a part of a law enforcement agency, and thus its budget is approved and adopted through that agency. The law enforcement

agency is a natural advocate and ally of the lab in this process. If forensic laboratories become independent, then they will be competing with law enforcement agencies in the budget process. In times such as we are living in today, when revenues are down and budgets everywhere are challenging, the labs may not fare as well in this process.

While the costs of the NAS proposal, foreseeable and unforeseeable, are cause for concern, more subtle changes could prove even more detrimental to the ability of law enforcement to fulfill its goal of protecting the community. Forensic science is nothing more than a tool to unravel the truth. It relies on the integrity of those supplying the evidence to be tested, and upon those who analyze that evidence. The function of collecting and storing evidence, a law enforcement function, inevitably includes the ability to impact that very same evidence, and with it the forensic results. If the goal is to prevent law enforcement from impacting the results of forensic exams, we might as well forbid law enforcement from investigating crimes. While this conclusion is ridiculous, it underscores the fact that overly broad recommendations not based in specific, identifiable problems will lead to absurd and unworkable solutions.

The reality is that administrative control of the forensic laboratory by law enforcement significantly speeds the investigative process. By allowing law enforcement to set the priority of analysis, those items with the greatest evidentiary value are processed first, thus the innocent are exonerated at an early stage and, conversely, the culpable party is identified, hopefully, before he or she can do additional harm.

If integrity and reliability in the scientific outcomes are truly at the heart of this effort, then the best approach would be to build upon that which is already in place. The Crime Laboratory Accreditation Programs of the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) are voluntary

Innovation in forensic science is most often through an unspoken collaboration: the commitment of law enforcement officers to hold the guilty accountable and to protect the victims upon whom they would prey, and the commitment of the forensic scientist to provide better, more definitive tools to unravel the truth.

programs in which any crime laboratory may participate to demonstrate that its management, personnel, operational and technical procedures, equipment, and physical facilities meet established standards. Why not move in the direction of ASCLD/LAB accreditation by all forensic labs? This step would build on the accomplishments of an organization with years of experience that is recognized both nationally and internationally.

ASCLD/LAB has been accrediting crime laboratories since 1982. As of May 2009, this internationally recognized organization has accredited 359 laboratories. Included in the accredited laboratories are 181 state laboratories, 117 local agency laboratories, 22 federal laboratories, 12 international (non-U.S.) laboratories, and 27 private laboratories.

And once again, if integrity and freedom from external influences are those attributes that the recommendation seeks to ensure, then mandatory accreditation of all crime laboratories should be the goal. As part of the ASCLD/LAB-*International* Accreditation Program, any laboratory granted accreditation must ensure that its management and personnel are free from any undue internal or external commercial, financial, or other pressures

and influences that may adversely affect the quality of their work.

Of the 32 state and local laboratories in California, all but one have been accredited by ASCLD/LAB in all forensic disciplines practiced within the laboratory. The only exception to full accreditation is the Fresno Sheriff's Crime Laboratory, which is accredited only in firearms and DNA.

Another aspect that cannot be downplayed or overlooked is the crucial role the criminal justice system plays in the outcome of any criminal matter. The adversarial system, providing opposing attorneys to present and refute evidence for or against their interests, is the best system ever devised to discover and reveal the truth. In the adversarial process, every piece of evidence can be examined—from the origin of the evidence through the journey from collection to analysis to findings. Within this system, qualifications of both the laboratory and the analyst can be examined. During discovery (the pre-trial exchange of information between the opposing parties), the validation studies of the laboratory (which assure the laboratory can reliably perform certain analyses) and the individual analyst's notes on a specific case can be reviewed and used in trial when appropriate to test the findings.

But perhaps one of the most troubling aspects of removing the forensic laboratories from law enforcement oversight will result from severing that close working relationship and the loss of the innovation that is borne of that relationship.

Innovation in forensic science is most often through an unspoken collaboration:

the commitment of law enforcement officers to hold the guilty accountable and to protect the victims upon whom they would prey, and the commitment of the forensic scientist to provide better, more definitive tools to unravel the truth. From 1892, when Argentinean Police Commodore Juan Vucetich lifted prints from a door post in an attempt to solve a murder in one of the first forensic uses of fingerprints in a criminal case,¹ to 1987, when DNA testing was first conducted in a criminal inquiry in England to identify a double murderer,² it was the perseverance of law enforcement to seek innovative methods that ultimately exonerated the innocent and identified the responsible parties.

The innovative, collaborative relationship between law enforcement and forensic science has survived for more than 100 years, and continues to this day. Some recent examples include:

- The program conducted by the San Diego County District Attorney's Office between 2000 and 2003 offering state prison inmates convicted in San Diego County the opportunity to undergo postconviction DNA testing.
- The program initiated in 2008 by the San Diego County Sheriff's Department, in conjunction with its forensic laboratory, to expand the use of DNA testing to property crimes. As a result, 90 percent of the cold hits from CODIS³ in San Diego County in 2008 were for suspects in burglaries, robberies, and other property crimes.

- The proposal by the Sacramento County District Attorney's Office, in conjunction with its forensic laboratory, to obtain and profile autopsy samples from deceased prison inmates who, while qualifying, had not been included in the California DNA database. By solving cold cases, even though the perpetrator identified would be deceased, the program would bring closure to victims and family members, and allow law enforcement to close these cases, directing valuable resources to solving other crimes.

Whatever the innovation, it is law enforcement using its close working relationship with forensic laboratories that reduces crime and enhances community safety. True innovation comes from those who strive to bring about justice, rather than from some new bureaucracy that merely strives to keep pace with the status quo. This, and more, would be severely compromised under the recommendations proposed by the National Academy of Sciences.

Jan Scully, Ed Jagels, and Dolores Carr are all elected district attorneys in California, with at least one law enforcement crime lab located in his or her county. They wish to thank and acknowledge Sacramento County Assistant Chief Deputy District Attorneys Jeff Rose and Albert Locher for their tremendous work in contributing to this article.

1. Argentinean Police Commodore Juan Vucetich was instrumental in the opening of the first fingerprint bureau at San Nicholas, Buenos Aires. In June 1892 at Necochea, Francisca Rojas' two children were murdered, and she implicated a neighboring ranch worker. A bloody fingerprint had been left on the door post of her hut, and she denied having touched the children's bloody bodies. By comparing the bloody impression against the inked impressions of the ranch worker and Ms. Rojas, Ms. Rojas was identified as the murderer, and the ranch worker was exonerated.

2. Lynda Mann and Dawn Ashworth, both 15 years old, were raped and murdered near Narborough, Leicestershire, England, on November 11, 1983, and July 31, 1986, respectively. In 1987, DNA testing was employed to exonerate a man who had falsely confessed to the crimes, and to identify Colin Pitchfork as the murderer of both girls.

3. Combined DNA Index System (CODIS) is a federally funded DNA database that stores DNA profiles created by federal, state, and local crime laboratories in the United States. It allows searches against crime samples recovered from victims and crime scenes, to assist in the identification of criminal suspects.

A Simplified Overview of Forensic DNA Testing

by Michael Chamberlain, Deputy Attorney General, California Department of Justice

Attorneys, jurors, and judges need to understand the basic mechanics of forensic DNA testing in order to evaluate the reliability and weight of the evidence with which they are presented. The following, therefore, is a simplified layperson's summary of forensic DNA testing.

In the "old days" of RFLP¹ testing, a DNA laboratory would need a blood stain about the size of a quarter—or the equivalent volume of some other biological evidence—in order to produce a robust and discriminating profile. Currently, the same quarter-sized blood stain could yield hundreds of separate DNA test results represented by a far, far more discriminating STR² profile. At present, only a few hundred cells are needed to generate an exceptionally rare DNA profile, meaning that crime scene evidence invisible to the naked eye can be dispositive of identity.

The laboratory process begins with the receipt of the evidence, whether collected from a crime scene or a reference sample from a known source (e.g., a suspect or victim) for comparison purposes. An analyst will first attempt to collect the cellular material from its background environment by, for example, swabbing a surface, cutting a swatch of fabric, or portioning out a rape kit or buccal³ swab that already exists. Next, the analyst will isolate the DNA from everything else using one of several methods. Commonly,

DNA from crime scenes is isolated by washing the sample through a chemical solution of enzymes, salt, and detergents. The solution breaks down cells and dissolves membranes, freeing the DNA strands formerly cocooned inside the nuclei of the cells.

In sexual assault cases, criminalists attempt to distinguish sperm cells from the victim's epithelial cells⁴ using a corrosive cocktail that breaks open the epithelial cells while sparing the hardier, more fortified sperm. Then, the intact sperm cells are separated from the rest of the cellular soup by spinning the mixture in a centrifuge. If all goes well, the analyst ends up with a collection of sperm cells from a single source, which is then subjected to a more rigorous chemical wash to release their DNA strands. In some cases, a mixture of cells from different contributors may be unavoidable.⁵ While a mixture of DNA from different sources does not necessarily prevent the analyst from being able to attribute discrete profiles to different individuals, doing so may require a degree of interpretation that may or may not affect the evidentiary value of the results.

The DNA extract is then combined in a tube with the contents of a commercially manufactured kit designed to duplicate, or "amplify," particular genetic locations (known as "loci")⁶ that are useful for identification purposes.

Each locus is made up of a sequence of repeating chemical "rungs" on the spiral staircase "ladder" that is the architecture of DNA. An entire human genome is made up of approximately three billion rungs, known as "base pairs" because they are a pair of one of four specific chemicals⁷ bonded together. A bonds with T, and C bonds with G. Generally four base-pairs long, the short sequences of interest to forensic scientists repeat themselves dozens of times, with the precise number of repeats depending on the locus at issue and the individual being tested.

The forensic loci are scattered among the 46 chromosomes every person inherits—one set of 23 from mother and one set of 23 from father. Typically, the testing kits correspond to 15 loci plus a gender indicator. For DNA database purposes, 13 of those loci⁸ were chosen as a national (and to some extent international) standard because they are highly variable between individuals and do not code for any known biological traits.⁹

Once the extracted DNA has been mixed with the components of the testing kit, the PCR¹⁰ process comes into play. Inspired by the enzymes that allow bacteria living in hot springs¹¹ to thrive and reproduce at otherwise life-threatening temperatures,¹² PCR is a genetic photocopier that permits amplification of select segments of the

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1. Restriction Fragment Length Polymorphism, common in courts from the late 1980s to mid 1990s.
 2. Short Tandem Repeat.
 3. Inner cheek scraping.
 4. Epithelial cells are mucus cells that line bodily orifices, such as the mouth and vagina.
 5. From the butt of a handgun held by several people, or a multiple-perpetrator sexual assault, for example.
 6. Singular = locus.
 7. Cytosine ("C"), Guanine ("G"), Thymine ("T"), and Adenine ("A").
 8. The CODIS core loci. CODIS stands for "Combined DNA Index System."
 9. Such as hair or eye color, for example.
 10. Polymerase Chain Reaction.
 11. *Thermus aquaticus*.
 12. 58° Fahrenheit.

genome for identification purposes by alternatively heating and cooling the tubes containing the extracted DNA and allowing the primers to do their work. Primers are artificial DNA sequences in the commercial testing kits. They are designed as specific complements to each locus of interest. As the tube is heated in an instrument known as a thermal cycler, the original DNA strands split apart, breaking the rungs of the ladder in two. The primers find and replace the original chemical components on each side of the ladder at those loci, and as the tube is cooled the bonds reform. Now there are two identical copies of each targeted locus instead of one. When this heating/cooling cycle repeats, the two new chemical ladders split apart again, this time into four one-sided pieces, partner with four new primers that are drawn to their complements, and reform as the solution cools. Now there are four copies of the locus instead of two. The process repeats more than 30 times, each time doubling the number of copies of the loci of interest, until billions of copies exist.

Once the amplification process is concluded, there are enough copies of the 13 or 15 loci to determine their alleles. An allele is the particular genetic characteristic existing on a chromosome at a particular locus. Because there are two sets of chromosomes that house a person's DNA, one allele for a locus will have been inherited from mother, and one from father. For the short repeating

sequences duplicated in the PCR process, the alleles are identified simply by the number of times the four-rung sequence repeats itself. For example, a person may have 16 repeats on one chromosome and 13 repeats on the other at that locus, making the person's alleles 16 and 13. Accordingly, a full DNA profile will feature, under perfect conditions, a set of 26 (13 loci, each with two alleles) or 30 (15 loci, each with two alleles) numbers.¹³ When two profiles are compared side-by-side, any single difference among the 26 or 30 alleles, organized by locus, means that the DNA samples came from different people.¹⁴

The number of repeating base-pair sequences at a locus is revealed by running the amplified DNA through an instrument housing a very thin capillary with a positive electric charge at one end and a negative electric charge at the other. This is known as "capillary electrophoresis." When the DNA segments pass by a small window in the capillary, a laser shines on them and excites fluorescent tags integrated into the primers added earlier in the process. Computer software converts the laser's reading into a fragment length that equates to a number of repeats, i.e., an allele. There are different colored fluorescent dye tags, allowing the computer to distinguish between different loci. Finally, the evidentiary significance of a DNA profile is measured by a statistic expressing its rarity. This is known as the

"random match probability statistic." It answers the following question: What is the probability that a person chosen randomly from a population¹⁵ will share that profile by chance alone? This is analogous to the "chance of winning" figure printed on the back of lottery tickets, which tells the consumer the likelihood that the ticket, by chance alone, will match the winning numbers picked by lottery administrators. The rarity figure is calculated by multiplying the frequency by which the various allele combinations can be expected to occur in a population against each other. This process is an application of the "product rule." The allele frequencies used exist in published data tables compiled and verified by researchers. In addition, conservative adjustments are applied to the random match probability formula to ensure that rarity is not overestimated.

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13. Frequently a person will receive the same allele from mother and from father, resulting in a "homozygous" allele pairing of, for example, 16, 16. In forensic DNA laboratory reports, a homozygous locus is often indicated with just one number, e.g., "16."

14. Of course, if there are enough shared alleles, it could be an indication of kinship.

15. Commonly divided into Hispanic, Caucasian, and African-American because of differences in allele frequencies between racial groups.

Contextual Contamination of Forensic Evidence by Postconviction Litigators

by John M. Collins and Jay Jarvis, *Crime Lab Report*

This article expands on research we reported in a 2009 article titled “The Wrongful Conviction of Forensic Science.” Since that study, which was published in *Forensic Science Policy & Management*, additional convictions have been overturned as the result of postconviction litigation and the use of DNA evidence. Since 1989, more than 230 convictions have been overturned. Representatives in the innocence network continue to work diligently to identify wrongfully convicted prisoners and secure their immediate release.

We argue, however, that the intense activism surrounding postconviction litigation introduces a potentially catastrophic form of contamination to postconviction proceedings. We refer to this phenomenon as “contextual contamination,” which is the misapplication of circumstantial information during the legal and judicial interpretation of scientific findings. Because DNA exonerations, as they are commonly called, often occur long after the original crimes were committed, newly acquired scientific findings, however accurate or valid they may be, can be improperly applied by litigators and judges who fail to consider the full significance and probative value of the forensic evidence.

From the perspective of the forensic science community, contextual contamination has also caused a serious problem outside of the courtroom. An energetic and persistent public policy campaign has been fueled by postconviction litigation activists who blame faulty forensic science for being a

leading cause of wrongful convictions. In this article, we provide a historical background for this campaign and demonstrate through actual case studies how serious the threat of contextual contamination is to the American criminal justice system and the safety of the public.

Authors’ Note

The conclusions and opinions expressed in this paper are solely those of the authors and do not necessarily reflect the views of any persons or organizations with whom the authors are affiliated or employed. We also wish to emphasize that we have no official opinion regarding the guilt or innocence of any individuals discussed in this paper. Readers are strongly encouraged to draw their own conclusions about a case only after they have independently researched all of the available information. The facts surrounding criminal cases such as the ones discussed here are complex and may not be entirely accessible to the public.

1989–2009: Twenty Turbulent Years

The year 2009 marked the end of what was possibly one of the most fascinating and compelling periods in the history of American criminal justice. It began 20 years ago on January 24, 1989, when one of the most infamous serial killers in United States history was executed. A crowd of nearly 200 people gathered outside the state prison in Starke, Florida, to cheer when they learned that Theodore “Ted” Bundy had died in the prison’s

Because DNA exonerations, as they are commonly called, often occur long after the original crimes were committed, newly acquired scientific findings, however accurate or valid they may be, can be improperly applied by litigators and judges who fail to consider the full significance and probative value of the forensic evidence.

electric chair.¹ His execution sent shock waves through a large community of death-penalty opponents whose efforts to convince public policy makers that capital punishment was inappropriate for criminals as violent as Bundy were losing their effectiveness. But only seven months later, on August 14, 1989, the tide quickly turned when Gary Dotson became the first man to be released from prison after DNA tests were used to demonstrate his innocence.²

The realization that scientific evidence as robust and reputable as DNA could be used to prove the innocence of wrongfully convicted defendants was a new opportunity that eventually gave birth to the modern innocence movement. Until that time, public opinion over the death-penalty was divided along ideological lines. The resulting lack of a strong public consensus created a heavy burden

1. Nordheimer, Jon. “Bundy Is Put to Death in Florida After Admitting Trail of Killings.” *New York Times* (Jan. 25, 1989) A1.

2. “Gary Dotson.” Northwestern Law—Bluhm Legal Clinic, Center on Wrongful Convictions, Exonerations, <http://www.law.northwestern.edu/wrongfulconvictions/exonerations/ilDotsonSummary.html> (as of Apr. 22, 2009).

on those seeking to abolish the death penalty for good. But in the face of new scientific evidence that revealed horrific errors committed by our justice system, it became evident that public support for the death penalty might eventually subside on its own. As a result, the vigorous movement to abolish the death penalty in the United States, which was so active during the decade of the 1980s,³ quickly gave way to a new and more powerful campaign to identify wrongly convicted prisoners and advocate for their immediate release.

The Innocence Network

Beginning in 1993, specialized educational clinics affiliated with law schools and journalism schools throughout the United States were established to review the cases of prisoners claiming to be innocent.⁴ Known as Innocence Projects, this concept, made famous by well-known criminal defense attorneys Barry Scheck and Peter Neufeld in New York, has been a successful one. Young students eager to make a difference while learning the nuances of criminal law are able to study actual cases in significant detail within a clinical setting. Further action is taken when a case is identified as having evidence that could realistically demonstrate the innocence of the prisoner. In most instances, this involves the existence of biological evidence that can be subjected to modern DNA testing techniques.⁵ Since the exoneration of Gary Dotson in 1989, more than 230 convictions have been overturned due to the efforts of the Innocence Project in New York City and its affiliates throughout the United States.⁶

We recognize the overwhelming value of the innocence network and its focus on correcting the human tragedy of wrongful convictions. But in a 2009 article titled “The Wrongful Conviction of Forensic Science,” we chronicled what they described as erroneous public policy rhetoric emanating from several high-profile activists within the innocence network.⁷ Much of this rhetoric disparaged the forensic sciences to the extent that reasonable people might be persuaded to distrust the work being performed in America’s crime laboratories. But as we observed, another factor magnified the problem considerably:

To the advantage of many within the innocence network, these statements were rarely, if ever, subjected to any serious examination and were quick to appear as front-page stories in major newspapers throughout the United States. With public enthusiasm for forensic science being so widespread, the notion that it could actually be contributing to the imprisonment of innocent citizens was a story too compelling to ignore.⁸

The National Academy of Sciences Report of 2009

A dramatic close to these 20 turbulent years came in February 2009 when the National Academy of Sciences (NAS) in Washington, D.C. released one of the most anticipated reports in its history, titled *Strengthening Forensic Science in the United States: A Path Forward*. Despite

how it was characterized in the media, the report was largely the result of cries from the forensic science community calling for an objective evaluation of the profession and the identification of areas where resources were most needed.⁹

For years, leaders in the forensic science community advocated for the infusion of funds into the forensic sciences so that laboratories could keep pace with growing demand, and research could be conducted to better demonstrate the validity of the most commonly practiced disciplines. Senator Richard Shelby of Alabama was a key proponent. In 2006, he urged the National Academy of Sciences to study the problems facing America’s forensic science laboratories and develop ways to help solve them.¹⁰ The result was the creation of the 2006 Committee on Identifying the Needs of the Forensic Science Community.

Contrary to some perceptions, the committee’s historic report did not claim or conclusively demonstrate that the most commonly practiced forensic disciplines were unreliable. In some instances, the report argued quite the opposite.

For decades, the forensic science disciplines have produced valuable evidence that has contributed to the successful prosecution and conviction of criminals as well as to the exoneration of innocent people.¹¹

The primary concern raised by the report was the “substantial evidence indicating that the level of scientific development and evaluation varies substantially among the forensic science disciplines.”¹² In other words, the committee recognized the need for

3. “Limiting the Death Penalty.” Death Penalty Information Center, <http://www.deathpenaltyinfo.org/part-ii-history-death-penalty> (as of Apr. 22, 2009).

4. “Innocence Network Member Organization.” The Innocence Network, <http://www.innocencenetwork.org/members.html> (as of Apr. 22, 2009).

5. “Mission Statement.” The Innocence Project, <http://www.innocenceproject.org/about/Mission-Statement.php> (as of Apr. 22, 2009).

6. Eligon, John. “New Efforts Focus On Exonerating Prisoners in Cases Without DNA Evidence.” *New York Times* (Feb. 7, 2009) A26.

7. Collins, John M. and Jay Jarvis. “The Wrongful Conviction of Forensic Science.” *Forensic Science Policy & Management* (Feb. 2009) 1, 17–31.

8. *Id.* at 19.

9. *Strengthening Forensic Science in the United States: A Path Forward-2009*. U.S. National Academy of Sciences (NAS). [Hereafter: NAS Report 2009.]

10. Protes, Ben. “The DNA Debacle: How the Federal Government Botched the DNA Backlog Crisis.” *ProPublica* (May 5, 2009), <http://www.propublica.org/feature/the-dna-debacle-how-the-federal-government-botched-the-backlog-crisis-505> (as of Apr. 22, 2009).

11. NAS Report 2009, *supra*, at S-3.

12. *Id.* at S-5.

a more robust and accessible body of research that would allow the validity of these disciplines to be verified.

The reason, however, that the NAS report represented the end of such a tumultuous and contentious period was the necessity it created for collaboration and the establishment of good partnerships to ensure that the forensic sciences are given the support that they need. For the most vitriolic activists in the innocence network, this will not necessarily be good news. As forensic science practitioners expand their collaborations with reputable academic institutions, we argue that there will be a decreasing tolerance for public policy recommendations that are based on ideological propaganda.

Dr. Roger Kahn is the former president of the American Society of Crime Laboratory Directors and a practicing DNA expert in Texas.¹³ He recently remarked about the precedent for science to transcend ideology. According to Dr. Kahn,

this clearly happened with DNA after the second report by the National Research Council on DNA testing. It led to important research and publications that resolved a variety of statistical questions in a rigorous manner. In doing so it strengthened the underpinnings of forensic DNA.¹⁴

Unfortunately, the NAS report of 2009 has a major flaw. Its authors lent credence to accusations that forensic science malpractice and invalid forensic methods are significant causes of

wrongful convictions without any authoritative, objective research cited to support those claims. The report noted that “in some cases, substantive information and testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people.”¹⁵ It also claimed that “imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence.”¹⁶ But no attempt was made to evaluate the frequency and severity of these instances. In light of the fact that erroneous forensic science was presented in the report as a major reason to create a new federal bureaucracy to oversee the forensic science community, it is surprising that the NAS report did not demand a more objective and thorough review of cases where forensic science malpractice is blamed for wrongful convictions and other complications occurring in criminal trials.

Contextual Contamination of Forensic Evidence

We are of the opinion that the blame assigned to faulty forensic science for wrongful convictions is a myth perpetuated by a psychological phenomenon known as “contextual contamination,” which has been shown to complicate psychological experiments by creating inappropriate central tendencies and anchoring effects.¹⁷ As it applies to the interpretation of forensic evidence, this means that certain circumstances and conditions can cause scientific findings to be misconstrued as confirming guilt or innocence when, in fact, they do not. It also means that forensic evidence

and testimony presented at trial can be unfairly characterized as faulty when, in fact, it is not.

The Mischaracterization of Forensic Evidence as Being Faulty

It was a hot and humid evening in Burlington, North Carolina, on July 28, 1984.

Jennifer Thompson, then a 22-year-old college student, had gone to bed early in her off-campus apartment. As she slept, a man shattered the light bulb near her back door, cut her phone line, and broke in.¹⁸ Thompson awoke to find a man pressing a knife blade to her throat. When she offered the man credit cards, money, and even her car, he simply said “I don’t want your money.”¹⁹

As she was being raped, Jennifer Thompson consciously focused on memorizing details about her attacker in the hopes that she would be able to identify him in the future. According to Thompson, she was “just trying to pay attention to a detail, [so] that if I survived, and that was my plan, I’d be able to help the police catch him.”²⁰

Eventually, she would identify 22-year-old Ronald Cotton, a local restaurant worker with a criminal history of pleading guilty to breaking and entering and sexual assault. Thompson was certain that Cotton was the man who had raped her. It would take only 40 minutes for a jury to agree with her and sentence Cotton to 50 years in prison. Two years

13. Merrick, Troy. “Leadership in the Forensic Sciences—An Ohio Perspective.” *Forensic Magazine* (Summer 2004), <http://www.forensicmag.com/articles.asp?pid=10> (as of Apr. 23, 2009).

14. “Legacy of historic document depends on good-faith collaboration.” *NAS Crime Lab Report* (March 4, 2009), <http://www.crimelabreport.com/library/pdf/3-09special.pdf> (as of Apr. 23, 2009).

15. NAS Report 2009, *supra*, at S-3.

16. *Id.*

17. Osgood, Charles E. *The Measurement of Meaning*. (University of Illinois 1957) 84.

18. Stahl, Lesley. “Eyewitness: How Accurate Is Visual Memory.” *CBS News/60 Minutes* (March 8, 2009) <http://www.cbsnews.com/stories/2009/03/06/60minutes/main4848039.shtml> (as of Jan. 30, 2009).

19. *Id.*

20. *Id.*

Unfortunately, the NAS report of 2009 has a major flaw. Its authors lent credence to accusations that forensic science malpractice and invalid forensic methods are significant causes of wrongful convictions without any authoritative, objective research cited to support those claims.

later, Cotton would also be convicted of a second rape that occurred around the same time.²¹

After 11 years in prison, DNA evidence helped to reveal Cotton's innocence. It also confirmed the real identity of Jennifer Thompson's rapist, Bobby Poole, who was being held in the same prison as Ronald Cotton for a separate offense. In fact, their physical appearances were so similar that inmates frequently mistook Cotton for Poole, and vice versa. But it was during the coverage of the O.J. Simpson murder trial in 1995 that Ronald Cotton learned about DNA evidence and began his own crusade to conclusively prove that his conviction was erroneous.²² Jennifer Thompson and Ronald Cotton, who are now friends, work collaboratively to help raise

awareness about the risks of eyewitness identifications.²³

By all accounts, the conviction of Ronald Cotton was overwhelmingly fueled by the certainty of the victim in her identification of him. During the trial, Thompson pointed to Cotton and affirmed "[Cotton] is the man who raped me."²⁴ The only forensic evidence presented to jurors in the case, however, was "a piece of foam found [at the crime scene] that seemed to come from one of his shoes."²⁵ Investigators later determined that the material was consistent with a pair of athletic shoes worn by Ronald Cotton—but inconsistent with material in Jennifer Thompson's shoes.

Despite the fact that

the foam rubber could have come from any one of a thousand athletic shoes in Almanac County, the possibility that it might have matched one of Ronald Cotton's shoes provided police reason to believe [that it may be a link] to the perpetrator.²⁶

Perhaps this is why the Innocence Project, as in many other cases, lists "invalid or improper forensic science"²⁷ as a contributing cause of Ronald Cotton's conviction.

What is troubling about those who blame faulty forensic science for Cotton's conviction is their apparent

lack of interest in whether the foam rubber was actually consistent with Ronald Cotton's shoes. Indeed, from a scientific perspective, this would be the primary consideration in determining whether or not the forensic evidence was improper. It would also matter whether or not the significance of the evidence was exaggerated during the trial. But no indication was found in the public record that such an instance of malpractice occurred. This includes summaries of the Ronald Cotton case published by the Innocence Project,²⁸ the Center on Wrongful Convictions at Northwestern University,²⁹ and the website for the Department of Justice's DNA Initiative.³⁰ The fact that DNA evidence was eventually used to demonstrate Cotton's innocence has no bearing on the validity of any forensic tests that were presented at his trial.

The Steven Barnes Case

Another high-profile case that became distorted by the Innocence Project was the conviction and exoneration of Steven Barnes. "Barnes was convicted in 1989 for the rape and murder of Kimberly Simon, whose body was found four years earlier near the Mohawk River in upstate New York."³¹ He was released from prison on January 9, 2009, when DNA testing "yielded conclusive results on sperm cells from the victim's body and clothing—none of which matched Barnes."³²

21. *Id.*

22. *Id.*

23. "Ronald Cotton." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/72.php> (as of Apr. 20, 2009).

24. O'Neill, Helen. "How DNA became a perfect witness." [Originally printed in *Toronto Star* (Sept. 21, 2000)] Reprinted at Death Penalty Information Center, <http://www.deathpenaltyinfo.org/node/589> (as of Apr. 23, 2009).

25. Stahl, *supra*.

26. Stack, Richard A. *Dead Wrong: Violence, Vengeance and the Victims of Capital Punishment*. (Praeger Publishers 2006) 72.

27. "Ronald Cotton," *supra*.

28. *Id.*

29. "Ronald Cotton." Northwestern Law—Bluhm Legal Clinic, <http://www.law.northwestern.edu/wrongfulconvictions/exonerations/ncCottonRSummary.html> (as of July 8, 2009).

30. "Ronald Cotton, Burlington, North Carolina." DNA Initiative, Exonerations, http://www.dna.gov/postconviction/convicted_exonerated/cotton (as of Apr. 20, 2009).

31. "Yet another wrongful conviction misattributed to faulty science." *NAS Crime Lab Report* (Feb. 18, 2009), <http://www.crimelabreport.com/library/pdf/2-09.pdf> (as of Mar. 31, 2009).

32. "Steven Barnes." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1775.php> (as of Apr. 23, 2009).

Forensic evidence presented by the prosecution during Barnes' trial included soil samples collected from the tires of Barnes' truck, which were similar to soil samples collected from the crime scene.³³

Expert testimony was also given that an imprint on the outside of the same truck was *similar* to the fabric pattern of a particular brand of jeans worn by the victim when she was killed. [Emphasis in original.]³⁴

In a commentary published on February 18, 2009, by *Crime Lab Report*, it was noted that one of the lead forensic examiners who testified in Barnes' trial stated emphatically "that the soil and fabric-pattern evidence were non-specific and could not be used to identify the perpetrator."³⁵

Sadly, Innocence Project cofounder Barry Scheck used the occasion of Barnes' exoneration to blame wrongful convictions on bad forensic science.

This is the latest in a long line of wrongful convictions based on improper or invalid forensic science that were ultimately overturned through DNA testing. Until there are clear national standards about what kind of forensic science can be allowed in court, more people like Steven Barnes will be wrongfully convicted while the actual perpetrators of violent crime remain at large.³⁶

DNA Activism—An Emerging Threat to Public Safety

It is critical to understand that DNA tests did not exonerate Ronald Cotton or Steven Barnes. In fact, DNA has

never exonerated anyone. In the Barnes case, for example, it was the compelling arguments made by Innocence Project representatives, who first took on his case in 1993, that the DNA tests were proof of innocence.³⁷ The foundation of this argument necessarily rested on the assumption that the sperm cells recovered from the victim were deposited as a direct result of her rape. Any possibility that they were deposited prior to the rape as a result of consensual sex with another partner would have to be ruled out in order for the DNA tests to be interpreted as evidence of factual innocence. In many cases, this may depend entirely on the word of the victim.

Forensic science is incapable of determining guilt or innocence. The term "DNA exoneration," used so frequently by journalists who report on overturned convictions, is a misnomer. DNA does not exonerate innocent prisoners—people do. As the Ronald Cotton and Steven Barnes cases demonstrate, very critical and sensitive leaps of logic are needed to cross the line that divides a DNA test result from the confirmation of innocence. Even though DNA results may seem intuitively exculpatory, extreme caution must be exercised. For this reason, the use of DNA evidence to overturn previous convictions is a profoundly serious matter that should be left to the devices of equally serious professionals.

In a 2001 interview of Innocence Project cofounder Peter Neufeld, which was aired by University of California Television, host Harry Kreisler asked Neufeld what "kept him going" despite the toll that his civil rights work must take on his personal life. Neufeld's answer was revealing:

The real thing is a desire to see things change. And to the extent that [a] case can have an impact on affecting the minds of just 12 people, not just about this case, but perhaps prospectively changing their outlook on justice, on racism, on the drug wars, on sexism, and on all kinds of issues is something that's terrific to be a vital part of.³⁸

In professional environments where scientific thinking is deemed critical to achieving successful and reliable outcomes, the desires that Neufeld explained are considered to be a dangerous contextual bias. In the world of science, efforts to change the status quo simply for the sake of change are risky when such efforts are not guided by reliable research or the thoughtful consideration of alternative hypotheses.

In a 2006 article published in *Forensic Science International*, researchers Itiel Dror, David Charlton, and Ailisa E. Peron of the School of Psychology at the University of Southampton warned of the dangers of bias in searching for the truth. They explained that

professionals must be able to dissociate themselves from extraneous contexts and other influences that may interfere with their ability to examine, evaluate, and judge the relevant information.³⁹

To the extent that the public policy tactics of the Innocence Project and its affiliates in the innocence network are haphazard and inconsistent, difficult questions should be asked about the capacity of postconviction litigators to honestly and properly interpret the

33. "DNA Frees Wrongfully Convicted Oneida County Man." *North County Gazette* (Nov. 25, 2008) http://www.northcountrygazette.org/2008/11/25/dna_frees/ (as of July 9, 2009). See also Rocco LaDuca. "DNA tests may shed light on 20-year-old Whitestown murder." *Utica Observer-Dispatch* (Dec. 1, 2008).

34. "Yet another wrongful conviction misattributed to faulty science." *NAS Crime Lab Report*, *supra*.

35. *Id.*

36. See endnote 33.

37. "Steven Barnes." Innocence Project, *supra*.

38. Kreisler, Harry and Peter Neufeld. *A Passion for Justice*. Conversations with History, University of California, Berkeley (UCTV Apr. 27, 2001).

39. Dror, Itiel E. et al. "Contextual information renders experts vulnerable to making erroneous identifications." *Forensic Science International* (2007) 156, 74–78.

significance of forensic test results. Furthermore, intense desires to seek exonerations should be construed as a contextual bias that requires due caution to be exercised. As Judge Morris Hoffman pointed out in an article published by the *Chicago-Kent Law Review* in 2007:

Sadly, the empirical literature on wrongful convictions is itself woefully infected with the mythology of factual innocence. Part of the problem, of course, is definitional. How does one determine factual innocence after the system—whose whole purpose is supposed to be truth-finding—has determined, whether by plea or trial, that a defendant is in fact guilty? This is the mother of all confirmation bias problems.⁴⁰

The Rape and Murder of Sharra Ferger

The potential injustices that can result from the misinterpretation of postconviction forensic evidence were thankfully, by all accounts, avoided after the tragic death of a nine-year-old girl in Pasco County, Florida.

On October 3, 1997, nine year-old Sharra Ferger was lured out of her ... home late at night and found murdered the next day. On the night she was abducted, she was wearing a green T-shirt she often wore to bed. She was stripped from the waist down. Two men then took turns raping her, one viciously biting her shoulder. They also scratched and beat her. She was then stabbed 46 times, 9 times in the head.⁴¹

Garry Cannon, 17, was convicted for the murder but could not be executed due to his age at the time of the crime. According to a report in the *St. Petersburg Times*, Cannon was linked to the crime through DNA evidence. A second perpetrator, Sharra's uncle, Gary Cochran, 39, would plead guilty a year later.⁴²

What makes this case so instructive was the potential for a wrongful exoneration if the circumstances had been just a bit different. The only forensic evidence linking Cannon to the murder was DNA evidence. Cochran's role, on the other hand, was confirmed by the comparison of his dental impressions to a deep bite mark found on Sharra Ferger's shoulder. But if DNA tests had not initially linked Cannon to the murder, and if Cochran had been convicted based on the bite-mark evidence, Cochran might later have been exonerated when subsequent DNA tests revealed that he, in fact, was not the contributor of biological evidence collected from Ferger's body. Based on what is known now, this could have been a wrongful exoneration resulting from the contextual contamination of the forensic evidence.

One could argue that this scenario is unreasonable because Cochran would likely have snitched on Cannon. But if this case had occurred prior to DNA testing and if Cannon made a compelling claim of innocence, it may have been difficult to link Cannon to the crime, particularly if he was excluded as the contributor of the bite mark on the victim's shoulder. All of these complex nuances illustrate that postconviction forensic evidence must be treated with the same degree of care and caution as evidence used during trial. As the 2003 exoneration of Steven Avery in

Wisconsin demonstrates, the stakes can be a matter of life and death.

From Exoneration to Murder—The Steven Avery Case

In 2003, 18 years after he was convicted for "the brutal attack of a woman jogging on a beach near Two Rivers, [Wisconsin,]"⁴³ Steven Avery was exonerated when a judge determined that DNA tests were conclusive proof of his innocence. But in 2007, Avery would be convicted of murder and sentenced to life in prison with no chance of parole. "You are probably the most dangerous individual ever to set foot in this courtroom," Judge Patrick Willis remarked. "From what I see, nothing in your life suggests that society would ever be safe from your behavior."⁴⁴

Two years before his murder conviction, Avery became "the first Wisconsin prisoner freed by the ... Wisconsin Innocence Project, which used DNA tests to link another man to the assault that put Avery in prison."⁴⁵ But in considering his sentence for the murder conviction, Judge Willis

reviewed Avery's history of convictions for burglaries, threatening a woman with a gun and dousing a cat with gasoline before throwing it in a bonfire, before sentencing him. The offenses escalated over time, Willis said, and the latest one—[the murder of Teresa Halbach]—was a "calculated" case of premeditated murder.⁴⁶

According to reports on the Teresa Halbach murder, Avery bound and gagged his victim, and then invited his young learning-disabled nephew, Brendan Dassey, to sexually assault her:

40. Hoffman, Morris B. "The Myth of Factual Innocence." *Chicago-Kent Law Review* (2007) 82:2, 668.

41. "Sharra Ferger." Remember the Innocents. Wordpress, <http://remembertheinnocents.wordpress.com/category/sharra-ferger-murdered/> (as of Apr. 21, 2009).

42. Thalji, Jamal. "Slain girl's agony laid out in Cannon trial." *St. Petersburg Times* (Sept. 15, 2005).

43. "Innocence Project wins second exoneration." University of Wisconsin Law School, News, http://www.law.wisc.edu/newsletter/In_the_Media/Wisconsin_Innocence_Project_Wins_2003-09-11 (as of Apr. 23, 2009).

44. "Avery Sentenced To Life In Prison." WISCTV (June 1, 2007), <http://www.channel3000.com/news/13426711/detail.html> (as of Apr. 23, 2009).

45. Kertscher, Tom. "Avery found guilty of killing woman." *Milwaukee-Wisconsin Journal Sentinel* (Mar. 19, 2007).

46. "Victim's video marks sentencing as Avery gets life with no parole." *The Avery Trial*. GMToday (June 3, 2007), http://www.gmtoday.com/news/special_reports/Halbach_murder/avery_trial.asp (as of Apr. 23, 2009).

Dassey had told the investigators that, after getting off his school bus Oct. 31, 2005, he took mail to Avery's trailer. There, Avery invited Dassey to have sex with Halbach, who was handcuffed, shackled and screaming. Dassey went home briefly, then returned, stripped, raped Halbach, then, after a discussion with Avery, helped bind and stab her before the pair took her to a garage where Avery shot her. After that, according to the confession, the pair burned her body in a pit.⁴⁷

In the rape case for which Avery served 18 years before being exonerated, the victim, Penny Ann Beernsten, described what happened to her along a stretch of Lake Michigan beach in 1985.

It happened in a beautiful place. I was out jogging when a man grabbed me from behind and pushed me into a wooded area. When I screamed, he choked my windpipe; when I fought back as he tried to rape me, he began beating and strangling me. Finally I lost consciousness. My last thoughts were: "I wish I'd kissed my son goodbye this morning" and "my daughter's last vision of me will be of my dead, beaten body."⁴⁸

Beernsten would later identify Avery in a lineup.⁴⁹ Avery was eventually exonerated when his DNA was excluded as being the same as biological samples recovered from Beernsten.⁵⁰ But what if the DNA was not deposited during the initial attack? After all, Penny Ann Beernsten had been strangled and slipped

into unconsciousness. What if Avery was, in fact, the initial attacker but failed to ejaculate? What if he then invited an accomplice to sexually assault Beernsten while she was unconscious—just like he allegedly did in the Teresa Halbach murder?

Penny Ann Beernsten is now an advocate for reforming eyewitness identification procedures. But as is the case with all postconviction DNA testing, the most defendants can hope for is to be excluded as the contributor of biological evidence. Science cannot confirm innocence. Thoughtful and knowledgeable people must look at the totality of the evidence and decide for themselves what the postconviction forensic tests actually mean. We can only hope that the Avery exoneration was not the result of contextual contamination, but rather a careful and collaborative examination of the evidence.

Only Steven Avery knows if he attacked Penny Ann Beernsten on a Wisconsin beach in 1985, but one thing appears certain. Had he not been exonerated, Teresa Halbach might be alive today and young Brendan Dassey might not have gone to prison. It is possible that strict national standards and better professional oversight are needed to govern postconviction litigation practices. But an even higher priority should be placed on providing specialized training to criminal justice professionals in the investigative interpretation of forensic evidence. Unlike the image portrayed by modern television programs, forensic scientists are rarely given access to all of the facts in criminal cases. For this reason, they cannot be relied upon to judge the relationships that exist between forensic testing results and circumstantial facts gathered by investigators. Scientists

can certainly be helpful in the process, but ultimately judges and lawyers must fully and properly evaluate forensic evidence before and after a conviction.

The Innocence Project Changes its Strategy

After Steven Barnes was exonerated in 2008, Barry Scheck set the tone for a new approach that the Innocence Project would take in advancing its campaign to discredit the forensic sciences. According to Scheck, "Unvalidated and exaggerated science convicted Steven Barnes and cost him nearly two decades, but real science finally secured his freedom."⁵¹ This statement represented a significant departure from the previous strategy of blaming wrongful convictions on what Scheck and his organization repeatedly termed "faulty forensic science" or "unreliable/limited science." But after we reported on the Innocence Project's mischaracterization of forensic science as often being faulty, there was a new effort by Barry Scheck and Peter Neufeld to characterize various forensic disciplines and practices as simply being "invalid."

This new tactic of blaming wrongful convictions on "invalid" science provided the Innocence Project with an escape hatch that did not exist before. Because their previous attempts to blame wrongful convictions on "faulty forensic science" were demonstrated to be erroneous, the more subjective interpretation of forensic evidence as being "invalid" would be easier for them to defend—not because forensic science disciplines are actually invalid, but because innocence activists could simply create a definition of validity that suited their own purposes.

As Barry Scheck's comment following the Barnes exoneration suggested, the

47. Nunnally, Derrick. "Dassey found guilty of murder." *Milwaukee-Wisconsin Journal Sentinel* (Apr. 26, 2007), <http://www.jsonline.com/news/wisconsin/29452139.html> (as of Apr. 23, 2009).

48. "Penny Beernsten, USA." The Forgiveness Project, <http://www.theforgivenessproject.com/stories/penny-beernsten> (as of Apr. 24, 2009).

49. "Steven Avery." Northwestern Law—Bluhm Legal Clinic, <http://www.law.northwestern.edu/wrongfulconvictions/exonerations/wiAverySSummary.html> (as of Apr. 24, 2009).

50. "Steven Avery." *supra*.

51. *North County Gazette* (Nov. 25, 2008), *supra*.

primary strategy now being employed by the Innocence Project is to hold DNA up as the standard for valid forensic science—or as Scheck opined, a “real science.” The basis for this strategy, however, is illogical and caters to the layperson’s lack of knowledge about DNA testing.

DNA Testing in Proper Perspective

Forensic DNA testing can be used effectively to demonstrate the innocence of wrongfully convicted prisoners when it is employed responsibly and case circumstances leave unanswered questions about the origin of biological evidence. In most overturned convictions, DNA testing was not feasible at the time of the original trials. Therefore, DNA provides an opportunity to undo miscarriages of justice even years after they were committed. But the recent strategy of anointing DNA as a standard of science that other traditional forensic disciplines fail to meet is grossly unfair and not based in reality.

DNA results are statistical in nature, so they are often perceived as being more scientific. DNA profiles are sets of numbers that can be easily entered into a spreadsheet and lend themselves quite nicely to being searched through complex databases. Probabilities can then be established and reported to express the likelihood that a particular DNA profile will occur randomly in particular segments of the human population. Unfortunately, there is a common misconception that these probabilities represent rates of error, which was famously magnified in 1993

by the United States Supreme Court in its landmark decision in *Daubert v. Merrell-Dow Pharmaceuticals, Inc.*⁵² But in many ways, the testing of DNA is very similar to its other forensic cousins such as latent print identification or firearm identification (ballistics). Education, training, expertise, and professionalism are needed to properly interpret all scientific evidence—including DNA. The actual rate of error in the practice of forensic DNA testing is currently not known.

Understanding Forensic Science Malpractice

Systemic failures in forensic science happen from time to time just as they do in other critical professions.⁵³ But we have come to learn through first-hand experiences as accreditation inspectors⁵⁴ and directors of internationally accredited forensic science laboratories⁵⁵ that such failures are almost always a symptom of an organizational deficiency, not junk science. These weaknesses can be repaired with improved management practices, improved levels of funding to meet demand for services, and better overall methods for managing quality. The 1996 National Academy of Sciences report on DNA testing acknowledged that a key element of quality assurance is

the responsibility of laboratory managers for all aspects of laboratory operations and performance, including definition and documentation of standards for personnel training, procedures, equipment

and facilities, and performance review.⁵⁶

When organizational cultures erode for any variety of reasons, the likelihood that employees will make mistakes or commit serious ethical infractions will increase.

Roughly three million cases are submitted to publicly funded crime laboratories each year costing taxpayers approximately \$1.1 billion.⁵⁷ The percentage of these laboratories that achieved accreditation status grew from 71 percent in 2002 to 82 percent in 2005.⁵⁸

Of all laboratories currently accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB), 73 percent achieved accreditation for the first time after 1992.⁵⁹

The vast majority of the 232 wrongful convictions we studied occurred prior to 1989 when forensic science accreditation had yet to revolutionize practices in forensic science laboratories.

Based on the current annual case volume, if publicly funded forensic science laboratories had an overall failure rate of 0.01 percent, which would be an impressive record of quality in any service industry, the total number of cases involving some sort of forensic science malpractice would still amount to a disturbing 300 cases each year. But consider a hypothetical scenario in which 1,000 erroneous laboratory

52. Bohan, Thomas L. and Erik J. Heels. “The Case Against Daubert: The New Scientific Evidence Standard and the Standards of Several States.” *Journal of Forensic Sciences* (1995) 40:6, 1030–1044.

53. The most publicized and infamous instances of malpractice were associated with a small number of individuals (i.e., Fred Zain, Joyce Gilchrist, Pamela Fish) who did not work in accredited laboratories.

54. Both authors (John Collins and Jay Jarvis) are trained and practicing volunteer-accreditation inspectors serving ASCLD/LAB.

55. Collins is the director of the DuPage County Crime Laboratory in Wheaton, Illinois. Jarvis served as the director of the Georgia Bureau of Investigation laboratory in Summerville, Georgia. Both laboratories are accredited under the international ISO 17025 standard for calibration and testing laboratories. The opinions and views expressed in this paper do not necessarily reflect those of any organizations or persons with whom the authors are affiliated.

56. *The Evaluation of Forensic DNA Evidence*. U.S. National Academy of Sciences (NAS) (1996) 78.

57. *Census of Publicly Funded Forensic Crime Laboratories, 2005*. U.S. Bureau of Justice Statistics (2008).

58. *Id.*

59. Collins and Jarvis, *supra*, at 28.

results go undetected by laboratories, investigators, and trial courts, **and** where the malpractice contributes directly to a wrongful felony conviction. Although this is a grossly unreasonable scenario in our opinion,⁶⁰ the chance that one of the three million cases worked by forensic science laboratories in the United States each year would directly result in a wrongful felony conviction would be approximately 0.0003 percent (that is three ten-thousandths of a percent.)

Recent Data in Overturned Convictions

Each wrongful conviction inflicts horrific pain on the victims and their families. For this reason, exonerations tend to elicit a prompt response from local journalists and strong emotional reactions from the relevant community. These emotions are to be expected; however, they do not necessarily allow for a clear and thoughtful examination of wrongful convictions or an accurate diagnosis of their causes.

There are signs that journalists are beginning to re-examine the complexities of wrongful convictions in the United States. In January 2009, the *Richmond Times-Dispatch* reported that the Urban Institute, “a 40-year-old organization that studies social and economic issues to promote sound public policy and effective government,”⁶¹ was awarded \$300,000 by the Department of Justice to examine the causes of wrongful convictions. In the *Times-Dispatch* report, a quote from Brandon Garrett, a professor of law at the University of Virginia, was included to put the complexity of postconviction litigation in perspective. According to Garrett, “wrongful-conviction cases are harder to study, much less generalize about.”⁶²

With this in mind, we examined the 201st through 232nd convictions overturned by the innocence network. In keeping with the methodology and principles published in *The Wrongful Conviction of Forensic Science*, each case was studied to determine the role of forensic evidence at the original trial. In several instances, trial transcripts were available for review.⁶³ The tables on pages 16–19 provide a summary of this examination.

Discussion

As discussed earlier, forensic science malpractice of a significant nature is rare and is unlikely to contribute to a wrongful conviction even when it does occur. At the time we wrote *The Wrongful Conviction of Forensic Science*, only one wrongful conviction had been associated with an instance of forensic science malpractice occurring in an accredited laboratory. As we observed:

[I]t was a false exclusion of a rape victim’s husband as being the contributor of semen found on a rape-kit swab and bedding from the victim’s home. The error did not directly incriminate the defendant. Also, the incident occurred in 1988 when crime laboratory accreditation was in its infancy.⁶⁴

Forensic science methods applied in laboratories accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) are subjected to so many checks and balances that the possibility that a catastrophic error or ethical violation would go undetected by

both the laboratory’s quality management system and the adversarial scrutiny of a trial court is extremely low.

Unfortunately, critics seeking to micromanage the forensic sciences with new bureaucracies and politically charged oversight schemes are unwilling to accept accreditation as a reliable, stand-alone system of quality control. Even worse, evidence that accreditation **does** work—the enhanced ability of accredited laboratories to identify failures—is irresponsibly mischaracterized as evidence that accreditation **does not** work. A laboratory that is able to look critically at its own operations and identify problems is a cause for celebration, not punishment. The internal mechanisms of self-assessment combined with the external mechanisms of peer assessment must be allowed to find and correct weaknesses without the risk of reprisal. If the basic principles of quality control and quality assurance in forensic science become contaminated by politics and the natural inclination of activists to punish what they perceive as wrongdoing, society can expect the forensic science infrastructure in the United States to collapse under its own weight.

When all types of evidence, scenarios, and potential failures in our criminal justice system are considered in the proper context, it is likely that forensic science is, and has been, a leading preventer of wrongful convictions. All criminal justice institutions have a certain capacity to process incoming cases with a finite number of people and resources to get the job done reliably. It is a mistake to think that these institutions operate differently than other types of organizations. If an automotive manufacturing plant, for example, attempts to keep pace with a level of

60. According to Judge Morris Hoffman in “The Myth of Factual Innocence” [see footnote 40], the federal plea bargaining rate is 96.3 percent. The state plea bargaining rate is 95 percent. To have 1,000 cases in one year in which forensic science malpractice directly contributes to a wrongful conviction is statistically unreasonable.

61. Green, Frank. “Va. Cases shed light on false convictions.” *Richmond Times-Dispatch* (Jan. 12, 2009).

62. *Id.*

63. A compilation of trial transcripts documenting scientific testimony was accessed by the authors during the preparation of this manuscript, http://www.law.virginia.edu/html/librarysite/garrett_exoneree.htm.

64. Collins and Jarvis, *supra*, at 28.

Table 1: Original convictions attributed solely to witness misidentification

Number of Cases: 11 of 32
 Percent of Cases: 34%

Exoneree	State	Incident	Exonerated	Transcripts	EVALUATION OF FORENSIC EVIDENCE		
					Exculpatory	No Bearing or Nonspecific	Malpractice
Travis Hayes ⁶⁵	LA	1998	2007	Yes	X		
James Waller ⁶⁶	TX	1983	2007	Yes	X		
John Jerome White ⁶⁷	GA	1980	2007	Yes		X	
Gregory Wallis ⁶⁸	TX	1989	2007	Yes		X	
Marcus Lyons ⁶⁹	IL	1988	2007	No		X	
Steven Phillips ⁷⁰	TX	1982-83	2008	No		X	
Andrew Gossett ⁷¹	TX	2000	2007	No		X	
Patrick Waller ⁷²	TX	1992	2008	No		X	
Robert McClendon ⁷³	OH	1991	2008	No		X	
Arthur Johnson ⁷⁴	MS	1993	2008	No		X	
Thomas McGowan ⁷⁵	TX	1985-86	2008	No		X	

Summary of the Forensic Evidence: In two cases, the convictions of Travis Hayes and James Waller, the forensic evidence was exculpatory. Hairs recovered from bed sheets were shown to exclude James Waller. In eight of the above 11 cases, the convictions were not supported by the forensic evidence. In the conviction of John Jerome White, forensic scientist Benny Blankenship testified that hair samples recovered from the crime scene “could have come” from White. But under both direct and cross-examination, he clearly explained that only similarities were observed and that he could not conclusively identify White as the contributor of the hairs. The defense attorney questioned Blankenship repeatedly about the significance of the evidence, which yielded testimony indicating the state of the art was not sufficient to make conclusive identifications.

65. “Travis Hayes.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/174.php> (as of Feb. 10, 2009).
66. “James Waller.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/439.php> (as of Feb. 10, 2009). See also Tuala Williams. “The James Waller Story: When being black was a crime.” *Louisiana Weekly* (Mar. 2, 2009), and “Dallas County records 12th DNA case.” *USA Today* (Jan. 19, 2007).
67. “John Jerome White.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1068.php> (as of Feb. 10, 2009). See also Dorie Turner. “DNA tests clears man after 27 years,” *Associated Press* (Dec. 11, 2007).
68. “Gregory Wallis.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/279.php> (as of Feb. 10, 2009). See also Robert Tharp. “DNA frees man jailed 18 years,” *Dallas Morning News* (Mar. 21, 2006).
69. “Marcus Lyons.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1249.php> (as of Feb. 10, 2009). See also Gerry Smith. “Rape conviction gone, stigma isn’t.” *Chicago Tribune* (Oct. 22, 2007), and John Patterson. “Governor pardons man cleared of DuPage rape,” *Daily Herald* (Dec. 20, 2008).
70. “Steven Phillips.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1614.php> (as of Feb. 10, 2009). See also Diane Jennings. “Dallas man freed from prison after 25 years,” *Dallas Morning News* (Aug. 6, 2008).
71. Tharp, Robert. “Inmate freed after DNA test.” *Dallas Morning News* (Jan. 5, 2007). See also Clif Caldwell. “DNA evidence sets another man free from prison.” <http://nacdl.org/public.nsf/DefenseUpdates/Texas023> (as of Mar. 31, 2009).
72. Ellis, Tiara M. “DNA exoneree Patrick Waller grateful for time with family after prison release,” *Dallas Morning News* (Nov. 26, 2008).
73. “Robert McClendon.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1551.php> (as of Feb. 10, 2009). See also Stephen Majors. “Judge frees convicted Ohio rapist after DNA test.” and “DNA test frees convicted Ohio child rapist.” *Associated Press* (Aug. 11, 2008).
74. “Arthur Johnson.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1628.php> (as of Feb. 10, 2009).
75. “Thomas McGowan.” Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1402.php> (as of Feb. 10, 2009). See also Steve McGonigle. “DNA evidence clears another Dallas County inmate.” *Dallas Morning News* (Apr. 15, 2008) and Jeff Carlton. “DNA sample identifies attacker from 1985 rape case.” *Associated Press* (June 17, 2008).

Table 2: Original conviction attributed solely to an informant/snitch

Number of Cases: 1 of 32

Percent of Cases: 3%

<i>Exoneree</i>	<i>State</i>	<i>Incident</i>	<i>Exonerated</i>	<i>Transcripts</i>	<i>EVALUATION OF FORENSIC EVIDENCE</i>		
					<i>Exculpatory</i>	<i>No Bearing or Nonspecific</i>	<i>Malpractice</i>
Chad Heins ⁷⁶	FL	1996	2007	Yes	X		

Summary of the Forensic Evidence: In the trial of Chad Heins, hairs recovered from the crime scene were eliminated as having come from Heins.

Table 3: Original convictions attributed solely to false/coerced confessions

Number of Cases: 2 of 32

Percent of Cases: 6%

<i>Exoneree</i>	<i>State</i>	<i>Incident</i>	<i>Exonerated</i>	<i>Transcripts</i>	<i>EVALUATION OF FORENSIC EVIDENCE</i>		
					<i>Exculpatory</i>	<i>No Bearing or Nonspecific</i>	<i>Malpractice</i>
James Dean ⁷⁷	NE	1989	2007	No		X	
Debra Sheldon ⁷⁸	NE	1989	2007	No		X	

Summary of the Forensic Evidence: Information regarding these two cases was limited. It appears, however, that false or coerced confessions were the primary contributing factors leading to the convictions.

Table 4: Original convictions with multiple causes—not supported by forensic evidence

Number of Cases: 5 of 32

Percent of Cases: 16%

<i>Exoneree</i>	<i>State</i>	<i>Incident</i>	<i>Exonerated</i>	<i>Transcripts</i>	<i>EVALUATION OF FORENSIC EVIDENCE</i>		
					<i>Exculpatory</i>	<i>No Bearing or Nonspecific</i>	<i>Malpractice</i>
James Curtis Giles ⁷⁹	TX	1983	2007	Yes		X	
Ronald Gene Taylor ⁸⁰	TX	1995	2008	Yes		X	
Dean Cage ⁸¹	IL	1996	2008	No		X	
Jerry Miller ⁸²	IL	1982	2007	No		X	
Willie Williams ⁸³	GA	1985	2007	Yes		X	

Summary of the Forensic Evidence: In the above five cases, forensic evidence was limited and/or nonspecific to the point that it had no significant role in demonstrating the guilt of the defendant.

76. "Chad Heins." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1052.php> (as of Feb. 10, 2009). See also Paul Pinkham. "After 13 years in prison, Chad Heins is a free man." *Florida Times-Union* (Dec. 5, 2007).

77. Huddle, Catharine and Joe Duggan. "Pardoned." *Beatrice Daily Sun* (Jan. 27, 2009). See also Scott Michels. "State seeks pardons for defendants wrongfully convicted in 1985 Nebraska murder." *ABC News* (Jan. 26, 2009).

78. "Debra Sheldon." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1807.php> (as of July 9, 2009).

79. McGonigle, Steve. "Judge Backs Man's Exoneration in '82 Rape Case." *Dallas Morning News* (Apr. 10, 2007) and "DA: '83 case mishandled, but man not cleared yet." *Dallas Morning News* (Mar. 10, 2008).

80. "Ronald Gene Taylor." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1124.php> (as of Feb. 10, 2009). See also Randall Patterson. "Ronald Taylor is one of perhaps hundreds of innocent people Harris County has sent to prison." *HoustonPress.com* (Oct. 9, 2008).

81. "Dean Cage." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1376.php> (as of Feb. 10, 2009). See also "Innocent man cleared of rape charges." *CBS News* (May 28, 2008).

82. "Jerry Miller." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/533.php> (as of Feb. 10, 2009). See also Maurice Possley, "Cleared by DNA after 26 years." *Chicago Tribune* (Apr. 22, 2007).

83. "Willie Williams." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/367.php> (as of Feb. 10, 2009). See also Thom Patterson. "Innocent man shares his 20-year struggle behind bars." *CNN.com* (Oct. 25, 2007); and Mathew Bigg. "DNA proves lifeline for falsely convicted in U.S." *Reuters* (Feb. 5, 2007).

Table 5: Original convictions attributed to multiple causes—non-specific forensic evidence presented by prosecution as evidence of possible guilt.

Number of Cases: 11 of 32
 Percent of Cases: 34%

<i>Exoneree</i>	<i>State</i>	<i>Incident</i>	<i>Exonerated</i>	<i>Transcripts</i>	<i>EVALUATION OF FORENSIC EVIDENCE</i>		
					<i>Exculpatory</i>	<i>No Bearing or Nonspecific</i>	<i>Malpractice</i>
William Dillon ⁸⁴	FL	1981	2008	No		X	
Charles Chatman ⁸⁵	TX	1981	2008	Yes		X	
Steven Barnes ⁸⁶	NY	1989	2009	No		X	
Rickie Johnson ⁸⁷	LA	1983	2008	Yes		X	
Nathaniel Hatchett ⁸⁸	MI	1998	2008	Yes		X	
Joseph White ⁸⁹	NE	1989	2008	No		X	
Ada Taylor ⁹⁰	NE	1989	2009	No		X	
Thomas Winslow ⁹¹	NE	1989	2009	No		X	
Kathy Gonzales ⁹²	NE	1989	2009	No		X	
Michael Blair ⁹³	TX	1994	2008	Yes		X	
Byron Halsey ⁹⁴	NJ	1988	2007	Yes		X	

Summary of the Forensic Evidence: With the exception of one case, the above convictions were associated with very weak or non-specific forensic evidence that could not conclusively associate or exclude the defendants. In the trial of William Dillon, dog scent tracking evidence was presented at trial and may have been presented as being more reliable than it actually is. But because dog scent tracking is not a forensic science, it was dismissed for the purposes of this study. In the case of Steven Barnes, exculpatory fingerprint evidence was presented as well as nonspecific pattern and soil comparisons.

84. "William Dillon." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1761.php> (as of Feb. 10, 2009). See also Mark Wangrin. "Charges Dropped Against Fla. Man Imprisoned 27 Years on Murder Conviction." *Associated Press* (Dec. 10, 2008).
85. "Charles Chatman." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1216.php> (as of Feb. 10, 2009). See also Steve McGonigle. "Dallas man cleared, freed after 27 years in prison." *Dallas Morning News* (Jan. 4, 2008).
86. "Rickie Johnson." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1120.php> (as of Feb. 10, 2009). See also Vickie Welborn. "Past year an adventure for Leesville man." *Shreveport Times* (Jan. 15, 2009).
87. "Nathaniel Hatchett." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1294.php> (as of Feb. 10, 2009). See also George Hunter. "Man exonerated after 12 years in prison." *Detroit News* (Apr. 15, 2008).
88. See footnote 80.
89. *Id.*
90. *Id.*
91. *Id.*
92. *Id.*
93. "Michael Blair." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1545.php> (as of Feb. 10, 2009). See also Linda S. Ball. "D.A.: Conviction in Ashley's Law case can't stand." *Associated Press* (May 24, 2008).
94. "Byron Halsey is Fully Exonerated in New Jersey after DNA Proves His Innocence in 1985 Child Rapes and Murders." Innocence Project, Press Releases, <http://www.innocenceproject.org/Content/689PRINT.php> (as of Feb. 10, 2009). See also Tina Kelley. "DNA in Murders Frees Inmate After 19 Years." *New York Times* (May 16, 2007). Also, "DNA Evidence Clears Former Inmate of Rape and Murder Charges After 22-year Sentence." *Fox News* (July 9, 2007).

Table 6: Original convictions attributed to forensic science malpractice

Number of Cases: 2 of 32
 Percent of Cases: 6%

<i>Exoneree</i>	<i>State</i>	<i>Incident</i>	<i>Exonerated</i>	<i>Transcripts</i>	<i>EVALUATION OF FORENSIC EVIDENCE</i>		
					<i>Exculpatory</i>	<i>No Bearing or Nonspecific</i>	<i>Malpractice</i>
Curtis McCarty ⁹⁵	OK	1986-89	2007	Yes			X
Kennedy Brewer ⁹⁶	MS	1995	2008	Yes			X

Summary of the Forensic Evidence: The malpractice cases shown in the above table are clear and convincing instances of forensic science malpractice. In the conviction of Kennedy Brewer, erroneous bitemark testimony was offered by Dr. Michael West, who at the time of the trial, had already been suspended from the American Board of Forensic Odontology for previous malpractice. But the court allowed his testimony despite his professional troubles. The conviction of Curtis McCarty, however, was one of several cases associated with the infamous Joyce Gilchrist who has been implicated in several instances of forensic science malpractice. It must be noted that neither of these convictions involved testimony from scientists who conducted their work in accredited forensic science laboratories.

Updated Data Tabulations for 232 Exonerations

When the data collected during this study are added to the tabulations previously reported by the authors, the following breakdown of the role of forensic science in overturned convictions can be examined:

Table 7: The role of forensic science—by number and percent of cases⁹⁷

Rank	Percent	Cases	Description
1	36%	83	Non-specific science failed to exclude the defendant
2	33%	76	Conviction was not supported by forensic evidence
3	17%	39	Forensic evidence was favorable to the defendant
4	15%	34	Forensic science malpractice
		232	

Table 8: Probable systemic failures in 232 convictions—by number and percent⁹⁸

Rank	Percent	Instances	Description
1	55%	174	Eyewitness misidentification
2	15%	47	False confessions
3	11%	34	Forensic science malpractice
4	9%	30	Government misconduct
5	9%	28	Informant snitches
6	1%	4	Bad lawyering
		317	

95. "Curtis McCarty." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/576.php> (as of Feb. 10, 2009). See also Henry Weinstein. "Murder charges dropped in 1982 slaying." *Seattle Times* (May 12, 2007) and "Judge frees man facing execution." *Los Angeles Times* (May 12, 2007).
96. "Kennedy Brewer." Innocence Project, Browse Profiles, <http://www.innocenceproject.org/Content/1176.php> (as of Feb. 10, 2009). See also Shaila Dewan. "Despite DNA Test, a Case Is Retried." *New York Times* (Sept. 6, 2007). Also, Steve Mills. "DNA voids murder conviction. 2nd man also freed in cases in Mississippi." *Chicago Tribune* (Feb. 16, 2008). And, Chris Francescani and Marcus Baram. "Did Bite Mark Expert Fabricate Evidence?" *ABC News* (Feb. 20, 2008).
97. For the purposes of this table, the Steven Barnes case was listed as a conviction with non-specific science although exculpatory forensic evidence was presented at his trial. Additional research is underway to look more carefully at the cases being attributed to forensic science malpractice. Significant uncertainty exists regarding the number of cases that should actually be labeled as such.
98. See footnote 97.

demand that is unmanageable given its current rate of staffing and capitalization, it will be more likely to assemble bad cars. If an accountant is faced with more tax returns than what he or she can handle in a given year, his or her filings to the IRS are more likely to have errors.

When organizations cannot keep up with demand, frustrations and incentives to take shortcuts will erode even the most robust organizational culture in any industry or profession. Certainly, this is not an excuse for gross malpractice or unethical behavior. Such instances cannot be tolerated and must be met with severe consequences. But it is also unethical to deprive prosecutors, public defenders, forensic scientists, and police officers of the resources they need to do their jobs completely and reliably. Who steps in to confront this kind of negligence? Ultimately, it falls on our elected leaders and their constituents to ensure that our criminal justice system has the resources it needs to work reliably and efficiently.

Summary and Conclusions

Eyewitness misidentifications continue to rank as the top factor contributing to wrongful convictions in the United States. No other factor comes close in terms of its collective impact on our justice system. It cannot be underestimated how important it is to accurately and completely tabulate the causes of wrongful convictions before assigning a specific share of the blame to any of them. Future studies subjected to the proper kind of peer review with sufficient transparency must look closer at overturned convictions to determine exactly how they happen and if, in fact, apparent instances of forensic science malpractice can be fairly labeled as such.⁹⁹ It is hoped that the work of the Urban Institute and other independent

researchers will succeed in this endeavor. But we warn that political wrangling and activism will contaminate the process and bring discredit to any useful conclusions that are rendered as a result of such studies.

Ultimately, the causes of wrongful convictions are really symptoms of a larger problem. It is the disease that needs to be cured. In the long run, public resources will be better spent on helping to improve the talent base and organizational cultures of our justice institutions. Strong organizations with strong leaders supported by talented, motivated employees are much less likely to make serious mistakes. In this regard, lawyers and judges should pay close attention to the management practices of crime laboratories serving their jurisdiction. Junk science is not a systemic problem in our criminal justice system. But struggling organizations burdened by increasing demand and dwindling resources are a systemic problem.

The next 20 years will hopefully bring new solutions. And if all goes well, the entire criminal justice system will improve its competence at evaluating forensic evidence and ensuring that contextual distortions are not allowed to contaminate criminal proceedings or public policy discussions related to the use of science in our search for justice.

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been patient in allowing us to serve the public by offering a more informative and accurate analysis of the issues facing the forensic science community.

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Jay Jarvis currently serves as a member of the ASCLD/LAB board of directors. He began his forensic science career in 1979, after receiving his master of science in forensic chemistry from the University of Pittsburgh. His scientific experience and training include firearm and toolmark identification; hair, fiber, paint, and glass analysis; shoe and tire impression comparison; arson and explosives analysis; latent fingerprint processing; presumptive blood testing; crime scene processing; and drug identification. He has appeared in court as an expert witness more than 750 times. He began his career in crime lab management in 1998. He is a trained crime laboratory accreditation inspector.

99. Collins and Jarvis, *supra*, at 26.

Postconviction DNA Testing, Due Process, and *District Attorney's Office v. Osborne*

by Michael Chamberlain, Deputy Attorney General, California Department of Justice

Courts nationwide have enthusiastically embraced DNA test results as identification evidence unsurpassed in accuracy and reliability. Consider a California appellate court's recent observations that "DNA is the most accurate and reliable means of identifying an individual presently available to law enforcement" and "DNA analysis is as close to an infallible measure of identity as science can presently obtain."¹ Legislatures nationwide have demonstrated similar commitment to DNA technology by enacting postconviction DNA testing statutes that recognize that, in appropriate cases, DNA testing even after conviction can enhance the credibility of the criminal justice system.² Until recently, a remaining unanswered question was whether the United States Constitution itself confers special status upon DNA testing, such that postconviction testing is a due process "right" that can be enforced through an action brought under title 42 United States Code section 1983, notwithstanding available state law remedies.

The United States Supreme Court answered that question in the negative on June 18, 2009, in *District Attorney's Office v. Osborne*.³ A landmark case, *Osborne* addressed the confluence of identification technology and due process protections. It clarified postconviction discovery roles, rights, and responsibilities for courts, legislatures, convicted defendants, and prosecutors. With *Osborne*, the Supreme Court has done much to shape the future

interplay of science, criminal procedure, and constitutional doctrine.

This article describes the central considerations in *Osborne*, focusing in particular on the impact a nearly national body of postconviction DNA testing legislation had on the Supreme Court's unwillingness to read a superceding mandate into the Constitution. A broader discussion of the principles underlying *Osborne's* reasoning is interwoven throughout.

The Supreme Court's Decision in Brief

In a 5–4 decision, the *Osborne* majority held that the due process clause does not afford a procedural or substantive right to postconviction DNA testing. Although convicted defendants possess a residual and limited liberty interest in demonstrating innocence with newly discovered evidence, state procedures for postconviction relief fail to provide procedural due process "only if they are fundamentally inadequate to vindicate the substantive rights provided [by the states]."⁴ And, held the Court, there is no novel freestanding substantive due process right to postconviction DNA testing, "untethered from liberty interests."⁵

In reaching these twin conclusions, the Court began by lauding DNA testing technology, noting that it

can provide powerful new evidence unlike anything known before.... It is now often

possible to determine whether a biological tissue matches a suspect with near certainty.... [T]here is no technology comparable to DNA testing for matching tissues when such evidence is at issue.⁶

Yet the Court correctly observed as well that DNA testing is not a crystal ball of guilt or innocence, and its availability "cannot mean that every criminal conviction ... is suddenly in doubt."⁷ The challenge faced, therefore, is "how to harness DNA's power to prove innocence without unnecessarily overthrowing the established system of criminal justice."⁸

Sorting out that dilemma is a task most appropriately left to state (and federal) legislatures, a principle the Court endorsed as a central foundation for its holdings.

The Osborne Case Facts⁹

The Crime

In March 1993, William Osborne and another man kidnapped an Anchorage prostitute, drove her to a remote area, and then sexually assaulted her at gunpoint. When they were finished, the assailants choked the victim, beat her with an axe handle, shot her in the head, buried her with snow, and left her for dead. Fortunately, the bullet only grazed the victim and she survived.

Police arrested one of the perpetrators a week later. He confessed, and told them that Osborne was his accomplice on the

1. *People v. Robinson* (2007) 156 Cal.App.4th 508, 518, 519 [review granted Feb. 13, 2008].

2. See, e.g., Garrett, Brandon. "Claiming Innocence" (2008) 92 *Minn. L.Rev.* 1629, 1719 [appendix].

3. *District Attorney's Office v. Osborne* (2009) ___ U.S. ___; 129 S.Ct. 2308.

4. *Id.* at 2320.

5. *Id.* at 2322.

6. *Id.* at 2316.

7. *Id.*

8. *Id.*

9. The facts recounted are according to the Ninth Circuit's opinion in *Osborne v. District Attorney's Office* (9th Cir. 2008) 521 F.3d 1118 (*Osborne II*).

night of the assault. The victim identified Osborne at trial. Other circumstantial evidence implicated Osborne, and he was convicted. Later, Osborne confessed to his involvement in the crimes in a written parole application and during a parole board hearing.

The Biological Evidence at Issue

One of the attackers had worn a blue condom; it was recovered from the crime scene during the investigation. DQ Alpha DNA testing, an early form of DNA analysis used primarily to exclude suspects, showed that sperm in the condom could not have come from the co-defendant, but could have been Osborne's. The genetic profile was not rare, however, and would be expected to occur in one out of every six or seven African-American males. Osborne's counsel made a strategic choice at trial **not** to subject the sperm from the condom to more discriminating RFLP DNA testing available at the time.

Alaska State Court Litigation

Following his conviction, Osborne filed a motion for postconviction relief with the trial court, seeking DNA testing of the sperm in the blue condom. While Alaska does not have a postconviction DNA testing statute, the Alaska trial court considered and denied the request under a three-part test created by the Alaska Court of Appeals. Applying the specified factors, the trial court on remand found that

(1) Osborne's conviction did not rest primarily upon eyewitness identification evidence, (2) no ... demonstrable doubt as to Mr. Osborne's identification

[as the perpetrator] has been established, and (3) [e]ven assuming that the DNA of either the pubic hair or the semen was tested and found not to be Mr. Osborne's, ... such evidence, if obtained, would not be conclusively exculpatory.¹⁰

Osborne's Federal Civil Rights Action, Part 1

Osborne then filed a federal civil rights lawsuit under title 42 United States Code section 1983, alleging that the denial of his request for postconviction DNA testing violated several of his constitutional rights and impaired his ability to prove his innocence in separate proceedings. The district court dismissed the suit. It held that under *Heck v. Humphrey*,¹¹ Osborne's section 1983 claim was not cognizable because it set the stage for challenging the underlying conviction by way of demonstrating actual innocence and, thus, could only be brought in a habeas proceeding. Osborne appealed, and the Ninth Circuit reversed and remanded.¹² It held that because Osborne sought access to the evidence for testing only, and because the testing would not necessarily demonstrate his innocence or affect the validity of his confinement, his claims were cognizable in a section 1983 action.¹³

Osborne's Federal Civil Rights Action, Part 2

This time, on remand, the district court ruled in Osborne's favor. It opined that a limited constitutional right to postconviction DNA testing does exist, and testing was merited in this case. The Anchorage District Attorney's Office appealed to the Ninth Circuit, which affirmed the district court.¹⁴

The Ninth Circuit's Expansive Reading of Postconviction Due Process Protections

The Ninth Circuit held that convicted offenders do possess a federal due process right to access biological evidence for DNA testing, based on principles underlying *Brady v. Maryland*.¹⁵ In reaching this conclusion, the Ninth Circuit postulated that a freestanding claim of innocence could be legally cognizable in a federal habeas proceeding or under state law, but noted that making such a claim is not a prerequisite to demanding or receiving postconviction DNA testing.

According to the Ninth Circuit, the constitutional standard governing discovery after conviction may in fact be lower than the constitutional standard controlling pretrial disclosures under *Brady*. The *Brady*-like right to postconviction DNA testing articulated by the Ninth Circuit requires a showing that is no higher than—and conceivably lower than—“a reasonable probability that, if exculpatory DNA evidence were disclosed,” the offender “could prevail in an action for postconviction relief.”¹⁶ This right can be asserted in a section 1983 lawsuit even if there is no pending habeas litigation, even if the convicted person has not made a claim of actual innocence, and even if the issue of postconviction DNA testing has been litigated and resolved on its merits in state court.

Brady v. Maryland and Procedural Due Process

Because the Ninth Circuit grounded its constitutional analysis in an extension of *Brady* principles to postconviction discovery, the Supreme Court discussed—and then rejected—the

10. *Id.* at 1125.

11. *Heck v. Humphrey* (1994) 512 U.S. 477.

12. *Osborne v. District Attorney's Office* (9th Cir. 2005) 423 F.3d 1050 (*Osborne I*).

13. Whether this holding was correct, i.e., whether a request for postconviction DNA testing is cognizable subject matter for a section 1983 action or whether it must be pursued in the context of habeas litigation given the ultimate goal of exoneration, was also an issue before the Supreme Court in *Osborne*. The Court declined to settle the issue, however.

14. *Osborne II*, *supra*, 521 F.3d 1118.

15. *Brady v. Maryland* (1963) 373 U.S. 83 [recognizing the mandatory disclosure by prosecutors of all material exculpatory evidence at trial stage].

16. *Osborne II*, *supra*, 521 F.3d at 1134.

applicability of a *Brady*-type mandate in a postconviction relief context.

Backing up first to the pretrial setting, there is little dispute that criminal defendants can and should have reasonable pretrial access to potentially exculpatory biological evidence for DNA testing purposes.¹⁷ Such access is consistent with “the central function of the trial, which is to discover the truth.”¹⁸ It is the potentially probative information inherent in DNA test results that compels this accepted pretrial practice, and not actual knowledge of what would otherwise be unrealistically preordained results. *Pennsylvania v. Ritchie*,¹⁹ for example, suggests that a defendant’s pretrial right to receive material exculpatory evidence in the government’s possession exists with respect to evidence where its actual relevance to a claim of innocence is unknown at the time.²⁰

Curiously, *Brady v. Maryland* itself is difficult to reconcile as a key authority for pretrial access to biological evidence before the test results are known because *Brady* is related exclusively to information whose character and evidentiary value are actually known and not based on speculation. *Brady* requires the prosecution to turn over to the defense “evidence that is both favorable to the accused and material to either guilt or to punishment.”²¹ Likewise, *Arizona v. Youngblood*²² recognized that only the destruction of evidence whose actual exculpatory value is apparent would constitute bad faith and an infringement

of due process protections. Untested DNA evidence does not fit well into the *Brady/Youngblood* paradigm because, as the Ninth Circuit acknowledged in *Osborne I*, the results of DNA testing cannot be characterized in advance: “DNA analysis may prove exculpatory, inculpatory, or inconclusive; thus, there is a significant chance that the results will either confirm or have no effect on the validity of Osborne’s confinement.”²³ “A significant chance” that DNA testing will reveal either inculpatory or meaningless evidence falls far short of satisfying *Brady*’s predicate requirements that the evidence be favorable and present a “reasonable probability” that without the DNA evidence the defendant would not receive “a fair trial, understood as a trial resulting in a verdict worthy of confidence.”²⁴

The Supreme Court had never applied *Brady* principles in a postconviction context but, instead, noted previously that a prosecutor’s duty to disclose information after conviction is grounded in ethical, not constitutional, obligations.²⁵ Moreover, as pointed out in the United States Solicitor General’s amicus curiae brief supporting the petitioners in *Osborne*, an indefinite and ongoing affirmative obligation to disclose material favorable evidence following conviction presents practical obstacles for the government, where those prosecutors familiar with the case may have moved on, retired, or otherwise had to focus on their active caseloads rather than engage

in continuous monitoring of long-since-finalized matters.²⁶

In *Osborne*, the Supreme Court agreed that *Brady* fails as a basis for a constitutional right to postconviction DNA testing. *Brady* “identifies a trial right,” with the goal of promoting a fair trial through pretrial disclosures.²⁷ While engaging in an unprecedented expansion of due process guarantees, the Ninth Circuit had not acknowledged that, after the “decisive and portentous event” of a guilty verdict, the context for considering discovery requests is strikingly different from that before the “main event” of trial.²⁸ A strong state interest in the finality of judgment is triggered following conviction, and the U.S. Constitution historically has not been read as facilitating continued collateral attack on final convictions.

To the contrary, the Supreme Court consistently has sanctioned reasonable restrictions on collateral attacks.²⁹ In *Teague v. Lane*,³⁰ for example, the Court held that new constitutional rules of criminal procedure will not be announced or applied on collateral review out of respect for final judgments. Elsewhere the Court observed that “[p]erpetual disrespect for the finality of convictions disparages the entire criminal justice system.”³¹

Consequently, *Osborne* continued a long tradition of Supreme Court jurisprudence recognizing that postconviction due process rights and remedies in state proceedings are very

17. Reasonable access to DNA evidence carries with it reasonable limitations, for example when limited quantities of DNA evidence exist and prosecution testing will consume the sample. (See, e.g., *People v. Varghese* (2008) 162 Cal.App.4th 1084, 1094.)

18. *Portuondo v. Agard* (2000) 529 U.S. 61, 73.

19. *Pennsylvania v. Ritchie* (1987) 480 U.S. 39.

20. *Id.*, citing *Brady v. Maryland* (1963) 373 U.S. 83.

21. *United States v. Bagley* (1985) 473 U.S. 667, 674 [quoting *Brady, supra*, 373 U.S. at 87]; see also *Arizona v. Youngblood* (1988) 488 U.S. 51, 57–58 [holding that only the destruction of evidence whose actual exculpatory value is apparent would constitute bad faith and an infringement of due process protections].

22. *Youngblood, supra*, 488 U.S. at 57–58.

23. *Osborne I, supra*, 423 F.3d at 1054.

24. *Kyles v. Whitley* (1995) 514 U.S. 419, 434.

25. *Imbler v. Pachtman* (1976) 424 U.S. 409, 427 fn. 25.

26. Amicus brief of Solicitor General, at 14; http://www.abanet.org/publiced/preview/briefs/pdfs/07-08/08-6_PetitionerAmCuUSA.pdf.

27. *Newsome v. McCabe* (7th Cir. 2001) 256 F.3d 747, 752.

28. *Wainwright v. Sykes* (1977) 433 U.S. 72, 90.

29. See, e.g., *Lockhart v. Fretwell* (1993) 506 U.S. 364, 372 [reiterating that “new constitutional rules of criminal procedure will not be announced or applied on collateral review” out of “respect for the States’ strong interest in the finality of criminal convictions....”]; see also *Heck v. Humphrey* (1994) 512 U.S. 477, 485 [expressing “concerns for finality and consistency” and recognizing that the Court “has generally declined to expand opportunities for collateral attack”].

30. *Teague v. Lane* (1989) 489 U.S. 288, 309–310.

31. *McCleskey v. Zant* (1991) 499 U.S. 467, 492.

limited. For example, the Supreme Court has held that there is no due process right to specific state clemency procedures,³² and due process considerations do not require states to provide counsel to capital defendants seeking postconviction relief.³³ In *Pennsylvania v. Finley*, the Court rejected the premise that “when a State chooses to offer help to those seeking relief from convictions, the Federal Constitution dictates the exact form such assistance must assume.”³⁴ Accordingly, and citing *Finley*, the *Osborne* Court reasoned that a defendant’s pretrial liberty interests underlying the rigid *Brady* obligation no longer exist, at least to the same degree, following conviction.³⁵ Thus the states have far more latitude in designing procedures for postconviction relief, and in that context due process does not impose strict mandates such as *Brady* disclosure.³⁶ Only where those state procedures “are fundamentally inadequate to vindicate the substantive rights provided,” held *Osborne*, may federal courts intervene.³⁷

Judicial Restraint Where Postconviction Relief Procedures Are Concerned

The *Osborne* majority observed that, as is true for postconviction criminal procedures in general, the federal judiciary would be well-advised not to engage in a re-balancing of competing interests implicated by postconviction DNA testing.³⁸ The balancing approach used to assess procedural due process claims under *Mathews v. Eldridge*³⁹ does not apply to state criminal justice systems. As components of

postconviction criminal procedure, DNA testing laws are not subject to a re-balancing of competing interests by the judiciary. The Supreme Court held in *Medina v. California* that “the *Mathews* balancing test does not provide the appropriate framework for assessing the validity of state procedural rules which ... are part of the criminal process.”⁴⁰ Instead, held *Osborne*, federalism demands a narrow and deferential inquiry: The due process clause will not proscribe the authority of a state to regulate procedures under its criminal laws unless the state practice “offends some principle of justice so rooted in the traditions and conscience of our people as to be ranked as fundamental.”⁴¹ In other words,

because the States have considerable expertise in matters of criminal procedure and the criminal process is grounded in centuries of common law tradition, it is appropriate to exercise substantial deference to legislative judgments in this area.⁴²

The class of criminal law due process violations is thus defined “very narrowly” based on the “limited operation” of the due process clause in state criminal law systems.⁴³

The decision of state legislators to enact postconviction DNA testing laws cannot be said to implicate, let alone offend, some fundamental principle of justice rooted in society’s traditions and conscience. To the contrary, the fundamental principle is that legislatures

should be accorded the latitude to do so. As Justice Frankfurter observed,

there is reason for judicial restraint in matters of policy deeper than the value of experiment: it is founded on a recognition of the gulf of difference between sustaining and nullifying legislation. This difference is theoretical in that the function of legislating is for legislatures who have also taken oaths to support the Constitution, while the function of courts, when legislation is challenged, is merely to make sure that the legislature has exercised an allowable judgment, and not to exercise their own judgment, whether a policy is within or without “the vague contours” of due process.⁴⁴

Osborne validated this long tradition of judicial restraint. In view of Alaska’s procedures governing access to DNA evidence following conviction, which are echoed in comprehensive state and federal legislation nationwide, the *Osborne* Court found nothing so fundamentally inadequate as to give rise to a federal cause of action.⁴⁵

Substantive Due Process, Federalism, and the Recent Explosion of State DNA Testing Laws

Further, the Supreme Court rejected *Osborne*’s argument that the due process clause grants convicted offenders a substantive, freestanding right to postconviction DNA testing,

32. *Ohio Adult Parole Auth. v. Woodard* (1998) 523 U.S. 272, 282–284.

33. *Murray v. Giarratano* (1989) 492 U.S. 1, 10 (plurality opinion).

34. *Pennsylvania v. Finley* (1987) 481 U.S. 551, 559.

35. *District Attorney’s Office v. Osborne*, *supra*, 129 S.Ct. at 2320.

36. *Id.*

37. *Id.*

38. *Id.*

39. *Mathews v. Eldridge* (1976) 424 U.S. 319.

40. See also *Herrera v. Collins*, *supra*, 506 U.S. at 407–408.

41. *District Attorney’s Office v. Osborne*, *supra*, 129 S.Ct. at 2320, quoting *Medina v. California*, *supra*, 505 U.S. at 445.

42. *Medina v. California*, *supra*, 505 U.S. at 445–446.

43. *Id.* at 443, quoting *Dowling v. United States* (1990) 493 U.S. 342, 352.

44. *American Federation of Labor v. American Sash & Door Co.* (1949) 335 U.S. 538, 555 (conc. opn. of Frankfurter, J.).

45. *District Attorney’s Office v. Osborne*, *supra*, 129 S.Ct. 2308.

“untethered from the liberty interests he hopes to vindicate with it.”⁴⁶ The Court was unwilling to identify that proposed novel substantive right within the due process clause, and declined to become the architect of a constitutional rule rife with nuances, parameters, and collateral implications such as preservation of evidence.⁴⁷ A critical factor for the Court was the reality that

[t]he elected governments of the States are actively confronting the challenges DNA technology poses to our criminal justice systems and our traditional notions of finality, as well as the opportunities it affords. To suddenly constitutionalize this area would short-circuit what looks to be a prompt and considered legislative response.⁴⁸

Principles of federalism and judicial restraint counsel against a constitutional mandate that would displace carefully calibrated state legislative approaches to postconviction DNA testing. The codification of postconviction DNA testing procedures exemplifies federalism, in which states “serve as laboratories for testing solutions to novel legal problems.”⁴⁹

Contrary to the Ninth Circuit’s approach in *Osborne*, courts historically have avoided “imposing a single solution on the States from the top down” in

the realm of criminal procedure.⁵⁰ Particularly when considering the integration of technological advances into postconviction proceedings, legislators and other state policymakers are presented with a complex and intricate range of options. “[J]udicial imposition of a categorical remedy,” noted Justice Kennedy, “... might pretermitt other responsible solutions being considered in Congress and state legislatures.”⁵¹ The Constitution “has never been thought [to] establish [the Supreme] Court as a rule-making organ for the promulgation of state rules of criminal procedure.”⁵² So, too, does the due process clause grant “substantial deference to legislative judgments” given the states’ “considerable expertise in matters of criminal procedure and the criminal process.”⁵³ Certainly all would agree that legislative innovation should be encouraged, particularly in response to new developments in technology that may aid the truth-finding function of the criminal process.

As illustrated by postconviction DNA testing statutes, the precise parameters of postconviction procedures require careful legislative balancing of interests in light of available technology: The Chief Judge of the Fourth Circuit summarized competing considerations:

There are often trade-offs to be faced when science advances. Scientific progress frequently

presents questions of resource allocation, interpretation, application, privacy, and ethics. Balances must be struck between societal risks and benefits, between alternative ways of understanding and employing new techniques, and between permissible and impermissible uses.⁵⁴

Had the Supreme Court affirmed the Ninth Circuit by constitutionalizing this application of DNA science despite the broad legislative activity in the field, the result could have been viewed as “a loss of faith in democracy.”⁵⁵

Because the existence of a national body of state and federal laws providing for postconviction DNA testing was a crucial consideration for the *Osborne* majority, and because, in light of *Osborne*, that legislation is now the bottom line consideration when postconviction access to evidence is at issue, the balance of this article will review and summarize that important body of law.

State Postconviction DNA Testing Laws: Objectives and Considerations

Currently, 46 states, as well as the federal government and the District of Columbia, have enacted statutory postconviction DNA testing procedures.⁵⁶ Of the remaining four states—Alabama, Alaska, Massachusetts, and Oklahoma—most

46. *Id.* at 2322.

47. *Id.* at 2323.

48. *Id.* at 2322.

49. *Smith v. Robbins* (2000) 528 U.S. 259, 275.

50. *Id.* at 274–275 [citing examples of deference to state pre-trial and postconviction procedures].

51. *Murray v. Giarratano*, *supra*, 492 U.S. at 14 (conc. opn. of Kennedy, J.).

52. *Spencer v. Texas* (1967) 385 U.S. 554, 564.

53. *Medina v. California*, *supra*, 505 U.S. at 445–446.

54. *Harvey v. Horan* (4th Cir. 2002) 285 F.3d 298, 301 (conc. opn. of Wilkinson, C.J.).

55. *Id.* at 303.

56. 18 U.S.C. § 3600; Ariz. Rev. Stat. Ann. § 13-4240; Ark. Code Ann. §§ 16-112-202 to -208; Cal. Pen. Code § 1405; Colo. Rev. Stat. §§ 18-1-411 to -416; Conn. Gen. Stat. § 54-102kk; Del. Code Ann. [tit. 11] § 4504; D.C. Code Ann. § 22-4133; Fla. Stat. Ann. §§ 925.11- 925.12, 943.3251; Ga. Code Ann. § 5-5-41(c); Haw. Rev. Stat. Ann. §§ 844D-121 to -133; Idaho Code Ann. § 19-4902(b)-(f); 725 Ill. Comp. Stat. Ann. § 5/116-3; Ind. Code Ann. §§ 35-38-7-1 to -19; Iowa Code § 81.10; Kan. Stat. Ann. § 21-2512; Ky. Rev. Stat. Ann. § 422.285; La. Code Crim. Proc. Ann. art. 926.1; 15 Me. Rev. Stat. Ann. §§ 2137-2138; Md. Code Ann., Crim. Proc. § 8-201; Mich. Comp. Laws Ann. § 770.16; Minn. Stat. § 590.01(1a); MS S.B. 2709 (eff. March 16, 2009); Mo. Rev. Stat. §§ 547.035, .037; Mont. Code Ann. § 46-21-110; Neb. Rev. Stat. Ann. §§ 29-4116 to -4125; Nev. Rev. Stat. Ann. § 176.0918; N.H. Rev. Stat. Ann. § 651-D:2; N.J. Stat. Ann. § 2A:84A-32a; N.M. Stat. Ann. § 31-1A-2; N.Y. Crim. Proc. Law § 440.30(1-a); N.C. Gen. Stat. §§ 15A-269 to -270.1; N.D. Cent. Code § 29-32.1-15; Ohio Rev. Code Ann. §§ 2953.71-2953.82; Or. Rev. Stat. §§ 138.690 to .696; 42 Pa. Cons. Stat. Ann. § 9543.1; R.I. Gen. Laws § 10-9.1-12; S.C. Code Ann. §§ 17-28-10 to -120; S.D. H.B. 1166 (eff. March 11, 2009); Tenn. Code Ann. §§ 40-30-301 to 313; Tex. Code Crim. Proc. Ann. arts. 64.01-.05; Utah Code Ann. §§ 78B-9-301 to -304; 13 Vt. Stat. Ann. §§ 5561-5570; Va. Code Ann. § 19.2-327.1; Rev. Code of Wash. § 10-73-170; W. Va. Code Ann. § 15-2B-14; Wis. Stat. Ann. § 974.07; Wyo. Stat. Ann. §§ 7-12-303 to -315.

have set forth analogous procedures and standards in case law and other postconviction discovery rules.⁵⁷ DNA testing is available as discovery in federal habeas corpus proceedings as well as upon a showing of good cause—a point emphasized by the *Osborne* majority.⁵⁸

Postconviction DNA testing laws nationwide recognize that the opportunity to generate accurate and objective identification evidence enhances the integrity of the criminal justice system. The Supreme Court has endorsed this view, noting for example in *House v. Bell*⁵⁹ that DNA evidence can be of “central importance” to postconviction litigation concerning actual innocence. At the same time, however, legislatures have taken care to construct effective statutory filters to ensure that testing will occur in truly meritorious cases but not in the many others where DNA testing would be a pointless and wasteful exercise.

The tension between the scientific capabilities and the legal limitations of forensic DNA is well-illustrated by the rhetoric and outcome of an Illinois appellate decision considering a convicted inmate’s request for postconviction DNA testing.⁶⁰ The court began its discussion by marveling that

[t]he miracle and wonder of DNA forensic technology has assumed an ever-increasing role in our quest for truth and justice. At times, DNA can possess the power to decisively negate other evidence that suggests guilt and virtually establish a person’s innocence.⁶¹

The “miracle and wonder” of DNA in the “quest for truth and justice” is language that seems to paint DNA as a panacea for the ills of the criminal justice system. Not so, even in that case. The Illinois appellate court concluded that the inmate was not entitled to the requested DNA testing. Not only did he fail to show “that the evidence was intact and capable of reliable testing,” but the requested testing would not have been exculpatory in any event:

Our Legislature did not intend to give convicted defendants free reign to claim innocence in order to test, or retest, evidence tangential to the core evidence of guilt. It did not intend to provide a mechanism for convicted defendants to cast doubt upon extraneous evidence incapable of shaking our resolve in a guilty verdict’s worth. [¶] Here, new forensic testing of blood samples is simply incapable of producing dramatic evidence of innocence. It would not decisively refute other evidence of guilt.⁶²

The utility of postconviction DNA testing is thus defined as much by the facts of the case as it is by the scientific techniques involved.

Legislators have long recognized the importance of a measured approach to postconviction DNA testing. In 2000, for example, the United States Congress discussed the need for federal legislation authorizing postconviction DNA testing

only in cases in which testing has the potential to prove the

prisoner’s innocence[, because t]his standard will allow testing in potentially meritorious cases without wasting scarce prosecutorial and judicial resources on frivolous cases.⁶³

The Director of the National Institute of Justice echoed the need for calibrated legislation:

[E]xperience also points to the need to ensure that postconviction DNA testing is appropriately designed so as to benefit actually innocent persons, rather than actually guilty criminals who wish to game the system or retaliate against the victims of their crimes. Frequently, the results of postconviction DNA testing sought by prisoners confirm guilt, rather than establishing innocence. In such cases, justice system resources are squandered and the system has been misused to inflict further harm on the crime victim.⁶⁴

In California, *Cooper v. Brown*⁶⁵ aptly demonstrated this concept by detailing how extensive postconviction DNA testing conducted at the defendant’s request confirmed that he was indeed the perpetrator. Jurisdictions nationwide have enacted effective DNA testing laws that address and achieve the balance of interests involved.

California’s experience is illustrative. In the year following enactment of California’s postconviction DNA testing statute, the California Innocence Project

57. See, e.g., *Fagan v. State* (Ala.Ct.Crim.App. 2007) 957 So.2d 1159, 1159 [“the need for postconviction DNA testing may be presented in a Rule 32 [postconviction discovery] petition”]; *Osborne v. State* (Alaska Ct.App. 1995) 110 P.3d 986, 995 [“[A] defendant who seeks postconviction DNA testing must, at a minimum, meet the three-part test endorsed by the state courts.”]; *Grayson v. State* (Miss. 2004) 879 So.2d 1008, 1017 fn.4 [leaving open the possibility of a valid non-statutory request for postconviction DNA testing]; *Jenner v. Dooley* (S.D. 1999) 590 N.W. 2d 463, 472 [setting forth specific guidelines governing requests for postconviction DNA testing]; Mass. R. Crim. P. 30(c)(4) [authorizing discovery attendant to claim for postconviction relief and encompassing DNA testing, per 2001 revision Reporter’s Notes].

58. *District Attorney’s Office v. Osborne*, *supra*, 129 S.Ct. at 2322; see, e.g., *Bracy v. Gramley* (1997) 520 U.S. 899, 908–909.

59. *House v. Bell* (2006) 547 U.S. 518, 540.

60. *People v. Urioste* (Ill.Ct.App. 2000) 736 N.E.2d 706.

61. *Id.* at 708.

62. *Id.* at 715.

63. Remarks of Sen. Hatch, 146 Cong. Rec. S9467 (daily ed. Sept. 28, 2000).

64. Remarks of Sen. Kyl [quoting Sarah Hart, Director, NIJ], 149 Cong. Rec. S14046 (daily ed. Nov. 5, 2003).

65. *Cooper v. Brown* (9th Cir. 2007) 510 F.3d 870.

reviewed more than 1,400 inmate cases.⁶⁶ This number does not include the unknown but possibly significant number of prisoner inquiries to public defenders and private defense attorneys throughout the state. In contrast to the Ninth Circuit's broad pronouncement, had California's law not established reasonable criteria designed to filter out cases inappropriate for DNA testing there likely would have been an unmerited and onerous degree of litigation in response to inmate motions.

Nationally, there are more than one million felony convictions every year.⁶⁷ The Innocence Project reports receiving "about 3,000 requests now a year for post-conviction DNA testing"⁶⁸ Thus, there exists an enormous population of convicted felons, many of whom may perceive DNA testing as a means of improperly prolonging litigation and injecting a degree of unfounded doubt into final judgments. Without effective filtering criteria, meritorious cases would have to stand in line behind cases unsuitable for testing, delaying the administration of justice.

The Federal Postconviction DNA Testing Law: A National Model

The ultimate product of congressional deliberation on postconviction DNA testing, the Innocence Protection Act of 2004 (IPA), was enacted after "years of work."⁶⁹ Codified at title 18 United

States Code section 3600, the federal postconviction DNA testing statute requires a threshold showing that

was the subject of intense negotiations, as members recognized that setting the standard too low could invite frivolous applications, while setting it too high could defeat the purpose of the legislation and result in grave injustice.⁷⁰

Further, section 3600 provides "additional disincentives to filing false claims or trying to 'game the system.'"⁷¹

Section 3600, is, by design, the model for its state counterparts.⁷² Section 413 of the IPA makes available federal grant funding—for law enforcement education and training, DNA research and development, missing-persons DNA programs, and postconviction DNA testing—only to states affording convicted felons the opportunity to pursue postconviction DNA testing.⁷³ State postconviction DNA testing statutes enacted before the IPA took effect must provide such testing "to persons convicted after trial and under a sentence of imprisonment or death for a State felony offense, in a manner that ensures a reasonable process for resolving claims of actual innocence."⁷⁴ States lacking a postconviction DNA testing statute as of October 30, 2004, must develop a postconviction DNA

testing procedure "comparable to section 3600(a)" in order to receive the specified grant funding.⁷⁵ In addition, qualifying state laws must "permit[] the applicant to apply for post-conviction relief, notwithstanding any provision of law that would otherwise bar such application as untimely" if the DNA test results exclude the applicant.⁷⁶

The IPA allows states

some flexibility in crafting their DNA laws. State procedures for providing postconviction DNA testing and preserving biological evidence need only be "comparable," not identical, to the federal procedures in sections 3600 and 3600A ...⁷⁷ As the general template for postconviction DNA testing legislation nationwide enacted in the last four years, section 3600 incorporates the basic features of its state law analogues.⁷⁸

The following are key elements of section 3600 and, by extension, many state statutes:

First, only currently incarcerated felons, including those sentenced to death, may request DNA testing.⁷⁹ This avoids expenditure of judicial resources on testing for those who have served their sentences and thus lack an interest in release from custody. It also prevents those convicted of misdemeanors from

66. Medwed, Daniel. "Actual Innocents: Considerations in Selecting Cases for a New Innocence Project" (2003) 81 Neb. L. Rev. 1097, 1116 fn. 71.

67. Stuntz, William. "Unequal Justice" (2008) 121 Harv. L. Rev. 1969, 2028 fn. 275.

68. Testimony of Peter Neufeld [co-founder and co-director of the Innocence Project] on behalf of the Innocence Project before the House Judiciary Subcommittee on Crime, Terrorism and Homeland Security 110th Cong. (April 10, 2008).

69. Remarks of Sen. Leahy, 150 Cong. Rec. S11610 (daily ed. Nov. 19, 2004); Pub. L. No. 108-405 §§ 413-432, 118 Stat. 2260, 2278-2293 (2004) [Title IV of the Justice For All Act of 2004].

70. Remarks of Sen. Leahy, 150 Cong. Rec. S11611 (daily ed. Nov. 19, 2004).

71. *Id.*

72. Innocence Protection Act of 2004 (IPA) § 413 [note to 42 U.S.C. § 14136, "Incentive Grants To States To Ensure Consideration Of Claims Of Actual Innocence"].

73. *Id.*

74. IPA § 413(2)(A)(i).

75. IPA § 413(2)(A)(ii).

76. *Id.*

77. Remarks of Sen. Leahy, 150 Cong. Rec. S11612 (daily ed. Nov. 19, 2004).

78. See also Garrett, Brandon. "Claiming Innocence" (2003) 92 Minn. L. Rev. 1629, 1719 (appendix) [charting core provisions of state postconviction testing laws].

79. 18 U.S.C. § 3600(a); but see, e.g., *People v. Schultz* (Ill. App. Ct. 2003) 799 N.E.2d 930 [Illinois statute affords postconviction DNA testing also to those who have completed their sentences].

placing an undue burden on courts, attorneys, and laboratories.

Second, if the applicant asserts under penalty of perjury that he is actually innocent, DNA testing may be sought in the case forming the basis for the current conviction, or another state or federal conviction used to enhance the current sentence.⁸⁰

Third, the motion for testing is made to the trial court “that entered the judgment of conviction.”⁸¹ These judges, having presided over the trial proceedings, are in the best position to assess the value of DNA testing in light of the facts of the case and evidence of guilt.⁸² Subsequent review by a federal district court based on a cold or partial record would lack the same element of familiarity with the facts and knowledge of the entire case.

Fourth, the chain of custody attributable to the biological evidence at issue must be intact, “to ensure that [the evidence to be tested] has not been substituted, contaminated, tampered with, replaced, or altered in any [material] respect”⁸³ DNA test results excluding the defendant as a source would be meaningless if a significant possibility exists that the evidence collected from the crime scene is not the same evidence, or in the same condition, as the evidence submitted for postconviction testing.⁸⁴ Especially in old cases where items may have been collected, handled, or stored without regard to the preservation of

biological evidence, the concern is real and must be taken into account.

Fifth, testing is precluded where the identity of the perpetrator was not an issue at trial.⁸⁵ An Illinois appellate court explained:

[O]ur legislature wanted postconviction forensic testing to occur only in those cases where such testing could discover new evidence at sharp odds with a previously rendered guilty verdict *based upon criminal acts that the defendant denied having engaged in*. Our legislature did not want convicted defendants who admitted at their trial to the commission of the acts charged, and did not contest the question of who committed those acts, to make a mockery of the criminal justice system and the statute’s grace. It did not want defendants who tendered unsuccessful affirmative defenses at their trial to later disavow the commission of the acts charged, just so they could obtain postconviction testing of evidence meaningless to how they contested their guilt. [C] Where a defendant contests guilt based upon self-defense, compulsion, entrapment, necessity, or a plea of insanity, identity ceases to be the issue.⁸⁶

Sixth, the physical evidence to be tested must be material to the issue of the perpetrator’s identity.⁸⁷ The California Supreme Court interpreted the analogous materiality requirement in California’s statute to mean evidence that is “relevant to the issue of identity.”⁸⁸ Where the absence of the defendant’s DNA on an evidence item would have been unsurprising or insignificant at trial, testing is not merited. For example, cigarette butts found on the ground near a homicide scene in a public park could not be subjected to postconviction testing absent a showing that they had been smoked by the killer.

Seventh, the court must find that DNA test results may “raise a reasonable probability” that the applicant is innocent of the charged offense.⁸⁹ In *Richardson v. Superior Court*, the California Supreme Court cited *Strickland v. Washington*⁹⁰ in holding that “reasonable probability” in this context refers to “a reasonable chance and not merely an abstract possibility ... that the defendant would have obtained a more favorable result [at trial].”⁹¹ This criterion appropriately forecloses DNA testing in cases where there is no reasonable probability that the absence of the convicted felon’s DNA, or the victim’s, would constitute proof that the convicted felon was not the perpetrator or a perpetrator.⁹² The purpose of postconviction DNA testing “is to establish the innocence of the

80. 18 U.S.C. § 3600(a)(1).

81. 18 U.S.C. § 3600(a).

82. Cf. *Watts v. United States* (9th Cir. 1988) 841 F.2d 275 [trial judge who presided over the plea hearing was in the best position to evaluate a motion to set aside the plea]; see also Cal. Pen. Code § 1405(f)(5) [permitting court to assess the testing motion “in light of all the evidence ... whether or not it was introduced at trial”].

83. 18 U.S.C. § 3600(a)(4).

84. See, e.g., *Middlebrook v. State* (Del. 2007) 918 A.2d 1170 [pointing to evidence item’s “contamination by multiple handlings of several police officers, prosecutors, court personnel and the jury” in affirming denial of postconviction testing]; accord, *United States v. Ivory* (D. Kan. 2005) 396 F.Supp.2d 1253, 1258 [citing expert witness testimony that “studies have shown that the major contributor [of DNA on an object] is generally the last person that handled the object”]; *Virgin Islands v. Byers* (D. V.I. 1996) 941 F.Supp. 513, 524 [DNA samples “can be contaminated by even microscopic quantities of another person’s DNA.”].

85. 18 U.S.C. § 3600(a)(7).

86. *People v. Urioste*, *supra*, 736 N.E.2d at 714, emphasis in original.

87. 18 U.S.C. § 3600(a)(8).

88. *Richardson v. Superior Court* (2008) 43 Cal.4th 1040, 1049.

89. 18 U.S.C. §§ 3600(a)(8)(B), 3600(a)(6)(B).

90. *Strickland v. Washington* (1984) 466 U.S. 668, 694.

91. *Richardson v. Superior Court*, *supra*, 43 Cal.4th at 1051; but see *Anderson v. State* (Del. 2003) 831 A.2d 858, 866–867 & fns. 17 & 21 [noting that some states have adopted more lenient standards than “reasonable probability”].

92. See, e.g., *Rivera v. State* (Tex. Ct. Crim. App. 2002) 89 S.W.3d 55, 60 [affirming the denial of postconviction DNA testing in part because, 18 hours after the crime, the presence of the victim’s DNA under the defendant’s fingernails could indicate guilt, but its absence would not indicate innocence].

A theory of innocence based on exclusionary DNA test results should not be fueled by “what ifs,” assumptions, and possibilities.

petitioner and not to create conjecture or speculation that the act may have possibly been perpetrated by a phantom defendant.”⁹³

For example, in a multiple-perpetrator sexual assault case, a vaginal swab collected from the victim during a post-event examination would not necessarily meet the “reasonable probability” threshold. The absence of any one perpetrator’s DNA on the swab would not exculpate him. It would demonstrate only that his cellular material was not on that particular swab.⁹⁴

A theory of innocence based on exclusionary DNA test results should not be fueled by “what ifs,” assumptions, and possibilities. A testing standard that invites such creative speculation is no standard at all. In a related context, the Supreme Court rejected a “conceivable benefit” test used by a lower court to evaluate whether the deportation of potential defense witnesses violated a defendant’s right to compulsory process guarantees by the Sixth Amendment:

Given the vagaries of a typical jury trial, it would be a bold

statement indeed to say that the testimony of any missing witness could not have “conceivably benefited” the defense. To us, the number of situations which will satisfy this test is limited only by the imaginations of judges or defense counsel.⁹⁵

Rather, a defendant denied access to potential witnesses would have to make “at least” a “plausible showing of how their testimony would have been both material and favorable to his defense.”⁹⁶

Eighth, DNA testing may occur only if no testing was conducted previously or if improved testing procedures have become available.⁹⁷ If no DNA testing was conducted previously, that opportunity must not have been waived or knowingly declined.⁹⁸ This requirement avoids redundant and repetitive motions for testing.⁹⁹ In addition, the federal statute resolves questions of notice,¹⁰⁰ selection of laboratory,¹⁰¹ testing technology employed,¹⁰² payment of costs,¹⁰³ and disclosure of results.¹⁰⁴ It also provides for sanctions should the applicant’s claim of innocence prove false in light of inculpatory DNA test results.¹⁰⁵ In short, section 3600 is comprehensive and fair. It is designed to facilitate DNA testing in appropriate cases and filter out requests that, if pursued, would only delay justice and prevent closure for victims. And due to the strong financial

incentives built into the Innocence Protection Act of 2004, it has become the predominant national model for this type of legislation.

Conclusion

When innocence claims are said to hinge upon scientific evidence, the canons of federalism and judicial restraint necessitate deference to state policymakers’ evaluation of the best use of that science in the criminal justice system. The *Osborne* Court recognized this reality. To endow any scientific technique with special constitutional status risks the counterproductive consequence that scientific testing will be sought and granted indiscriminately as an end unto itself, rather than being used selectively as a calibrated tool for determining the truth. While some critics argue that *Osborne* limits the availability of identification technology following conviction, the opposite is true. *Osborne* endorsed creative and progressive state legislation incorporating scientific advances into criminal procedures. The decision should thus act as a stimulant for continuing state-level policy innovations that enhance the truth-seeking function of the criminal justice system.

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93. *Alley v. State* (Tenn. Crim. App. 2004) Lexis 471, *25, cert. den., *Alley v. Tennessee* (2005) 544 U.S. 950.

94. See, e.g., *Galloway v. State* (Fla.Ct.App. 2001) 802 So.2d 1173, 1175 [“The fact that only appellant’s co-defendants may have deposited DNA at the crime scene or on the body of the victim does not mean that appellant was not there.”]; *People v. Gholston* (Ill. Ct. App. 1998) 697 N.E.2d 375, 421 [denying postconviction DNA testing because the absence of the applicant’s DNA on a swab would not be exculpatory where “there were multiple defendants who participated in the sexual assault, one or more of whom may have ejaculated”].

95. *United States v. Valenzuela-Bernal* (1982) 458 U.S. 858, 866–867.

96. *Id.* at 867.

97. 18 U.S.C. § 3600(a)(3).

98. 18 U.S.C. § 3600(a)(3)(A)(i)–(ii).

99. This requirement also likely would preclude testing in respondent *Osborne*’s case because *Osborne* knowingly and for strategic reasons refused a highly discriminating DNA test available at the time of his trial. (*Osborne II*, *supra*, 521 F.3d at 1123 & fn. 2.)

100. 18 U.S.C. § 3600(b).

101. 18 U.S.C. § 3600(c)(1)–(2).

102. 18 U.S.C. § 3600(a)(5).

103. 18 U.S.C. § 3600(c)(3).

104. 18 U.S.C. § 3600(e). Unlike the federal statute, some state laws provide also for appointment of counsel to indigent defendants for investigation and preparation of a motion for postconviction DNA testing. See, e.g., Cal. Penal Code § 1405(b); Ct. Gen. Stat. § 54-102kk(e).

105. 18 U.S.C. § 3600(f)(2).

Targeting Career Criminals with DNA Evidence: Where Criminalistics Meets Criminology

by Gregory Thompson, Director of Forensic Services, San Diego County Sheriff's Regional Crime Laboratory

A quarter of a century has passed since Rand Corporation famously published the research and findings of Peter Greenwood on career criminals.¹ The term “career criminal” was not entirely new, having bounced about the lexicon of law enforcement, criminal justice, and politics. But through Greenwood’s work, the notion of career criminals gained academic currency and courthouse observations hardened into criminological verities: A small percentage of criminals commit a disproportionate number of criminal acts. They are disparate in their acts—stealing and assaulting without specialization. They are predatory, striking whenever there is opportunity.

As well as describing the career criminal, the Rand study and its prodigy suggested a policy prescription. Sheriffs, police chiefs, and district attorneys developed specialized investigative and prosecution teams targeting the career criminal with a particular aim: arrest and incapacitation. In 1975, President Gerald R. Ford summed up the policy syllogism succinctly: “The career criminal is a one-man crime wave,” he declared. “If we can bring him to a speedy trial, and make sure that, if found guilty, he is sent back to prison, we can give the streets back to the people”²

Throughout the late 1970s and early 1980s, academic research on the subject of career criminals continued, often with a nod (derisive or otherwise) to Greenwood’s seminal work. Still, with due respect to those researchers,

it is accurate to say their work has gone largely unnoticed outside of academic circles. It has been criminologists talking to criminologists.

Until now.

Today, leaders in law enforcement and criminal prosecution are paying particular mind to the lessons of research about those offenders who with regularity commit burglaries, robberies, and auto thefts. The reason is hardly intuitive: The entrance of a new player onto the field, namely forensic DNA, has made the value of solving these street crimes a critical issue. Formerly deployed exclusively to prove or solve violent crimes—in particular, homicides and sexual assaults—forensic DNA is now being called upon to help solve those crimes most committed by career criminals. That in turn is raising new questions about the value of solving these crimes.

Here then are the issues posed: Can forensic DNA be effectively deployed to solve street crimes and, if so, so what?

In 2008 in San Diego County, the Sheriff’s Regional Crime Laboratory created a specialized Rapid Response DNA Team targeting street crime. It works something like this:

Step 1. Evidence recovery. A patrol deputy responds to a residential burglary to take a report. The homeowner describes missing property and also points out that a can of beer, half-consumed, on the dining room table was

not there when she left for work that morning. It must, she declares, have been left by the burglar. The deputy takes the beer can as evidence and requests that it be analyzed forensically. There is no suspect.

Step 2. Forensic analysis. At the crime lab, a fingerprint examiner attempts to develop latent prints on the can in order to enter them into AFIS (Automated Fingerprint Identification System). In turn, a DNA criminalist looks for the presence of DNA from the saliva on the lip of the can. If successful in developing a DNA profile, that profile is uploaded into CODIS (Combined DNA Index System) to search for a match. Uploads take place twice a week.

Step 3. Notifications and follow-up. If there is a hit, the Department of Justice’s Bureau of Forensic Services notifies the crime lab. The lab then formally notifies the detective of the hit so that the investigator can advance the investigation and, where appropriate, make an arrest.

At first blush this sounds like an extraordinarily onerous effort to identify the offender in what can be fairly categorized as a garden-variety burglary. Indeed, the effort appears even more extraordinary when Step 2, the forensic DNA analysis, is broken down into its scientific components: screening (the DNA analyst conducts presumptive tests

1. Greenwood, Peter W. *RAND Research on Criminal Careers: Progress to Date*. Rand Corporation. U.S. Department of Justice, Note-1286 (August 1979). See also Greenwood, Chaiken, Petersilia, and Peterson. *The RAND Habitual Offender Project: A Summary of Research Findings to Date*. Rand Corporation. U. S. Department of Justice, Paper-5957 (March 1978).
2. Greenwood. “Career Criminal Prosecution: Potential Objectives.” *The Journal of Criminal Law and Criminology* (Northwestern University 1980) Vol. 71:2, 85–88.

for the presence of DNA); extraction of the DNA from the cells; quantitation (the analyst conclusively establishes the presence of DNA); PCR amplification (the DNA is multiplied so that it can be examined); electrophoresis (a DNA profile is identified); and analysis and interpretation of the data. All of this is technically reviewed by a second criminalist and administratively reviewed by a third, and precedes submission of the profile to CODIS.

So, why the extraordinary effort to solve an ordinary crime?

Before the passage of Proposition 69, the DNA Fingerprint, Unsolved Crime and Innocence Protection Act, by California voters in 2004, The San Diego County Sheriff's Department lab obtained CODIS hits with the rarity of striking gold. Indeed, for the entire year of 2004, DOJ notified the laboratory of 19 cold matches to offenders (case-to-offender hits). That describes the "before."

Then along came Proposition 69, which authorized inclusion in the database of DNA from all persons convicted of felony crimes in California. The database grew enormously—from roughly 300,000 known offenders to more than one million currently. And it continues to grow, particularly because of the change in law by which California now includes in CODIS all felony **arrestees**, rather than only those convicted. So here is the "after." In 2006, a year after Proposition 69 became effective, the sheriff's lab obtained 122 cold hits to offenders, an increase in a single year of 700 percent. In 2007 that number nearly doubled again to 222 cold hits. The year 2008 yielded 264 cold hits.

Significantly, the lab is still in the process of building a Rapid Response Team—hiring and training new DNA

criminalists. Significantly, all of the CODIS hits were to cases without suspects, cases that would have otherwise gone unsolved. Surprisingly, the hits came in types of cases not anticipated.

The laboratory had for some time encouraged street cops, deputy sheriffs, and city patrol officers to collect potentially valuable biological evidence from the scenes of burglaries, robberies, auto thefts, and other property crimes with the idea that if a suspect turned up later in the investigation, a DNA criminalist would develop a profile from that evidence and compare it to the suspect. Consequently, in case after case, evidence was gathered and submitted to the lab: blood stains, cigarette butts, beer bottles, soda cans, discarded hats and t-shirts. In the hands of today's forensic scientist, all this physical evidence represents potentially valuable biological evidence. And because of the passage of Proposition 69, there is markedly increased potential to link the evidence to a suspect.

Therefore, the lab's criminalists made a push to develop DNA profiles and get them into CODIS. There was success, as expected, in obtaining hits in homicides and sex crimes. What was surprising was the number of hits to burglars, robbers, and auto thieves. In 2006, 75 percent of the cold hits to offenders were to crimes other than homicide and sexual assault. More than half were to burglaries. In 2007, the lab sharpened its focus and made a concerted effort to get DNA profiles from the evidence at street crimes and get them into CODIS, the percent increased to 90 percent, a figure that held throughout 2008.

The San Diego County experience mirrors what has happened in other jurisdictions where there has been a

push to deploy DNA to help solve street crimes.

Beginning in 2005 and concluding in 2007, the National Institute of Justice (NIJ) funded five demonstration projects to "explore whether DNA was a cost-effective tool for investigating and prosecuting high-volume property crimes such as home and commercial burglaries and car thefts and car break-ins."³ The DNA Field Experiment, as it was called, was evaluated by the Urban Institute, which focused its study principally on burglary investigations.⁴

The results were stunning—with "the potential," in the words of *NIJ Journal* editor Nancy Ritter, "to turn a significant component of our criminal justice system on its head."⁵ According to the study, when the collection of DNA evidence was added to the criminal investigation of a burglary, it showed these results:

- More than twice as many suspects were identified.
- Twice as many suspects were arrested.
- More than twice as many cases were accepted for prosecution.⁶

Further, the study revealed that "suspects were five times more likely to be identified through DNA evidence than through fingerprints."⁷

In Denver, one of the project sites, more than 12,000 burglaries were investigated in the city and county of Denver. From these, 600 DNA profiles were obtained from evidence collected from crime scenes. These profiles were uploaded to CODIS by the Denver Police Department Crime Laboratory, resulting in 245 hits to known offenders. Stated another way, of the cases uploaded to CODIS, 41 percent produced hits.

3. Ashikhmin, Simon, Susan Berdine, Gregory LaBerge, Mitchell Morrisey, and Dawn Weber. "Using DNA to Solve High-Volume Property Crimes in Denver: Saving Money, Lowering Crime Rates, and Making Denver Safer." *The Prosecutor*. National District Attorney's Association (2008) Vol. 42:3, 34–38.

4. Roman, John K., Shannon Reid, Jay Reid, Aaron Chalfin, William Adams, and Carly Knight. *The DNA Field Experiment: Cost-Effectiveness Analysis of the Use of DNA in the Investigation of High-Volume Crimes*. National Institute of Justice, Research Report. Urban Institute, Justice Policy Center (2008).

5. Ritter, Nancy. "DNA Solves Property Crimes (But Are We Ready For That?)." *National Institute of Justice Journal* (October 2008) No. 261, 1–2.

6. *Id.*

7. *Id.*

This compares to burglary cases without DNA, which typically identify a suspect “in only 8 percent of the cases.”⁸ The NIJ study confirmed in hard numbers the anecdotal evidence in Orange County, California, another of the project sites, which was proactive in selectively applying forensic DNA technology to the investigation of burglaries even before the NIJ DNA Field Experiment.⁹

While the results of the NIJ project are invariably described as stunning and surprising, some researchers are not entirely surprised: namely, those who have tracked the experience in the United Kingdom.

Researcher Christopher Asplen reported in January of 2004 on “The Application of DNA Technology in England and Wales.” In these jurisdictions, law enforcement and forensic professionals tap into the UK’s redoubtable database with remarkable effectiveness. He reports that there is a “40 percent chance of obtaining a match between crime scene profiles and [an offender] profile” loaded into the National DNA Database. Further, the discovery of DNA at a crime scene “increases the suspect identification rate for domestic burglary from 14 to 44 percent.”¹⁰

The NIJ experiment and the results in the United Kingdom foreshadowed the experience in San Diego, where criminalists today systematically develop DNA profiles from biological evidence in all manner of cases. Those profiles are uploaded into CODIS. Significantly, in 2008 CODIS reported a match to a suspect in more than half the cases submitted. More precisely, 53 percent of

the cases submitted to CODIS matched to a suspect unknown to the investigators. This exceeds the hit rate in fingerprint cases (around 10 percent) and the highly reputed hit rate in the United Kingdom.

At the outset, I suggested two issues: First, can forensic DNA be effectively deployed to solve street crimes—does it work? This is being answered definitively and dramatically by actual experience: Pioneer efforts show that forensic DNA technology, when systematically deployed, can provide the key evidence to help solve street crimes, most particularly burglaries.

The second issue may seem cryptic: If it works, so what? Does it matter? Do these admittedly impressive results represent information worth acting upon? NIJ editor Ritter phrases the issue this way: “[T]here is something lurking behind the good news. Policy decisions. Big policy decisions.”¹¹ Facts, after all, are facts: “DNA-led investigations are more costly than business-as-usual . . . [U]sing DNA works, but it costs.”¹² Stated bluntly, in a world of scarce resources what is the return on the dollar for solving a burglary?

To address this issue we turn from criminalistics to criminology.

Since the days of the Rand studies of the 1970s and 1980s, researchers have added to our collective understanding of the career criminal and the cost—financial and human—of his unchecked behavior. Stated in the argot of the social science researcher, “the criminal careers paradigm has emerged as one of the foremost paradigms in criminology.”¹³ As a result, criminologists have minutely tracked

the ways that criminal offending patterns emerge, continue, escalate, desist and ultimately end Taken together the studies indicate a broad pattern of themes involving material gain, sexual drive, and substance abuse.¹⁴

Principle findings of Rand’s researcher Greenwood have held true. Career criminals represent, by definition, the predatory element of criminal behavior: opportunists with a vengeance, driven by money, sex, drugs, or some combination thereof. And burglary remains a mainstay of the career criminal’s repertoire and consequently a focus of state laws throughout the U.S. targeting habitual offenders.¹⁵

This truth is almost so obvious it is easy to overlook, like visiting the Grand Canyon and asking, “Where’s the view?” To reduce crime in a community means taking the fight to career criminals and that means reducing burglaries, which nationally make up a fifth of all property crimes in the nation.¹⁶

The cost of a residential burglary is, of course, not limited to the financial impact, about \$1,725 loss to the victim on average,¹⁷ as anyone who has worked with crime victims well knows. Even the most routine of residential burglaries leaves in its wake victims who feel violated and vulnerable, with the human cost most explicit when the crime also involves sexual deviance. Researchers document that “sexual predator burglars” comprise about 6.1 percent of burglars but are “disproportionately involved in the

8. *Id.*

9. Roman, *supra*.

10. Asplen, Christopher H. *The Application of DNA Technology in England and Wales*. U.S. Department of Justice, Final Report-203971 (January 2004).

11. Ritter, *supra*.

12. *Id.*

13. Vaughn, Michael, Matt DeLisi, Kevin Beaver, and Matthew Howard. “Toward a Quantitative Topology of Burglars: A Latent Profile Analysis of Career Offenders.” *Journal of Forensic Science* (November 2008) Vol. 53:6, 1387–1390.

14. *Id.*

15. Roman, *supra*. [The researchers document habitual offender research, the emergence of sentencing schemes targeting habitual offenders (including California’s Three Strikes law), and its relevance to the investigation of burglaries.]

16. Vaughn, *supra*.

17. *Id.*

most serious forms and total incidence of crime.”¹⁸

In addressing the value of solving a burglary, researchers naturally think futuristically—of crimes that will not be committed because the burglar has been identified and his criminal career aborted.

Because even non-violent burglars often matriculate to violent crime, burglary has been called a gateway crime. Violent street criminals generally begin with lesser, non-violent crime, including commercial and residential burglary. This is borne out in a Florida study that showed that 52 percent of CODIS database hits in murder and sexual assault cases “matched individuals who had prior convictions for burglary.”¹⁹ A study in New York showed the same link between “lesser offenses” and violent crimes:

A review of New York’s first 1,000 hits showed that the vast majority were linked to crimes like homicide and rape but of these, 82 percent of the offenders were already in the data bank as a result of a prior conviction for a “lesser” crime such as burglary or drugs.²⁰

The state forensic biology chief for the state of Alabama, Angelo Della Manna, was quoted in *USA Today* as saying that over the course of five years “80 percent of the rapes solved via DNA databasing ... were linked to criminals whose DNA was taken after a burglary conviction.”²¹

Burglary has among the lowest clearance rate of any reported crime, generally reported at 12 percent but in some U.S. cities is as low as 8 percent.²²

DNA evidence, as we have seen, drives up that clearance percentage significantly. The cost-benefit question asks whether it also drives down the number of burglaries itself.

Of all of the NIJ DNA Field Experiment sites, Denver’s approach was most decidedly a crime control exercise. Denver District Attorney Mitchell Morrissey, reporting with his researchers the impact of the NIJ Experiment, is categorical: “In the two years of the project, the number of burglaries was reduced by 26 percent.”²³ To reach this causal conclusion, he points to the following:

- The presence of DNA in a burglary investigation was more likely to result in an arrest and prosecution. “[B]urglary project cases containing DNA evidence were eight times more likely to be presented by a police detective [for prosecution] and accepted for filing by the District Attorney’s Office than were cases that did not have DNA evidence.”²⁴
- Second, the evidence held up at trial. Cases with DNA evidence “resulted in convictions at trial three times more frequently than trials in which there was no DNA evidence.”²⁵
- Third, because of the strength of the forensic evidence, those cases “resulted in pleas to the top charge far more frequently than cases in which there was no DNA evidence.”²⁶
- And last, because of the evidentiary strength of the case, project cases permitted the District Attorney to

target career criminals and secure lengthy prison sentences for the most prolific offenders—including one defendant who by his own admission had committed more than 1,000 burglaries. District Attorney Morrissey states that prison sentences were “10 times longer for home burglars and six times longer for commercial burglars” in cases with DNA evidence when compared to those without DNA evidence.²⁷

These conclusions invite a new model for the deployment of forensic DNA technology: namely, as a tool of crime control. Burglars will, if not apprehended, continue to commit crimes and, in some instances, those crimes will escalate. That is the message from nearly four decades of research in criminology on career criminals. The message from criminalistics is that through powerful DNA databases, DNA criminalists can provide definitive evidence to help law enforcement identify those career criminals.

At the San Diego County Sheriff’s Regional Crime Lab, Supervising Criminalist Connie Milton, who leads the Rapid Response Team, tracks the impact of her team’s work with investigators and prosecutors. Not only have the majority of CODIS hits in recent years been for street crimes cases, but the team has also seen an increase in the number of cases where a single offender has been tied to two or more separate crimes by the proactive testing of DNA evidence. She describes this example: Between November 2007 and April 2008, one individual committed multiple burglaries in different parts of San

18. *Id.*

19. Zedlewski, Edwin, and Mary B. Murphy. “DNA Analysis for ‘Minor’ Crimes: A Major Benefit for Law Enforcement.” *National Institute of Justice Journal*. (January 2006) No. 253. See also “Clearances.” *Uniform Crime Report: Crime in the United States, 2006*. Federal Bureau of Investigation, U.S. Department of Justice.

20. *Id.*

21. Willing, Richard. “DNA database used to help solve thefts.” *USAToday* (Oct. 19, 2006), http://www.usatoday.com/news/health/2006-10-19-dna-analysis_x.htm (as of July 15, 2009).

22. Ashikhmin, *supra*.

23. *Id.*

24. *Id.*

25. *Id.*

26. *Id.*

27. *Id.*

Diego County. DNA evidence items left behind at four of these crime scenes were eventually linked to each other and to a convicted offender. One of these cases was originally submitted alone to the district attorney's office for prosecution in June 2008, but the case was rejected for insufficient evidence. A few months later, when it came to light that this same individual had been identified in four different burglaries by DNA evidence left behind (a latex glove, a popsicle stick, a juice bottle, and an energy drink can), the four cases were submitted together by law enforcement for prosecution by the district attorney's office—this time with a much different result. A convicted burglar from a crime spree in Napa County in 2002, the defendant was charged under California's Three Strikes law.

In another example, Supervising Criminalist Milton describes a decidedly sloppy burglar who left behind biological evidence at six separate residential burglaries: blood at two sites, on water bottles at two sites, on a screw driver, and on a glove. DNA criminalists identified him through CODIS—a one-man crime wave, but not a suspect.

For most of the public, a tool capable of identifying a serial residential burglar justifies itself. Still, the Denver District Attorney took this finding a step further. His researchers examined the financial impact of the effort and concluded that identifying burglars results in significant cost avoidance to the public. "Over the two years of the project," he writes, "an estimated \$36.8 million in property loss was avoided, and \$5 million in police costs were saved."²⁸ This, he states, is because "more than 95 habitual burglars (who can be responsible for more than 200 crimes a year) were captured using DNA."²⁹

Since the cost of the NIJ Experiment over a two-year period for the five test

sites was nearly \$42 million, pricey by any measure, the arithmetic matters. Indeed, District Attorney Morrissey's team does not shy away from the math. Citing such specifics as detective and patrol time, average salaries, and average time spent investigating crimes, the Denver prosecutor reports that "each \$1 invested in DNA forensics and related fields (such as police and lab training) resulted in more than \$90 of prevented police expenses and property loss."³⁰

This cost paradigm tracks the overall finding of those charged with the evaluation of the NIJ project site by site, city by city. The Urban Institute's Justice Policy Center provides a detailed analysis of the distribution of increased costs to the laboratory conducting the analysis (about 66 percent of the total), the local law enforcement agency (25 percent), and the state lab administering CODIS (9 percent). "The DNA Field Experiment results suggest," the researchers conclude, "that DNA is cost-effective in burglary investigations."³¹

Historically, decisions about investment in public safety and criminal justice are driven in only small part by cost-benefit. Public officials, elected or otherwise, are reticent to put a price tag on personal security, the quality of life in neighborhoods, the safety of families. Indeed, what is the value of justice and upholding the rule of law in a community?

Still, new technology demands cost-benefit scrutiny. But in penciling out the costs, it is important to know what is in the balance and what is not. Policymakers and leaders in law enforcement and criminal prosecution now face a decision: whether to invest in the deployment of forensic DNA to solve street crimes. On one side of the scale will be the success of the pioneer deployments. Significantly, what will be on the other side is not an

alternative strategy to solve burglaries, because there is none. Older than common law, the crime still confounds enforcement.

Rather, what is being weighed in the balance is this: deciding to deploy this new forensic strategy versus deciding to do nothing. That is the choice.

John Roman, senior research associate at the Urban Institute and a leader in the evaluation of NIJ's DNA Field Experiment, struck by its success, offered a verdict in terms uncharacteristic for a researcher: "There is," he concluded, "a criminal justice revolution coming."³² In the days ahead Californians will decide—law makers and law enforcers alike—what side of the revolution they are on.

Gregory Thompson has served as the Director of Forensic Services for the San Diego County Sheriff's Department since January 2003. He is responsible for the oversight of a full-service forensic laboratory, including crime scene investigations. He directs a staff of 60 forensic scientists and field evidence technicians. Among his initiatives was the creation of a Cold Case Forensic Team to examine unsolved homicides. Mr. Thompson previously served as the Assistant District Attorney for San Diego County, where he directed all prosecution, investigative and support operations with a staff of 1,200 and a budget of \$92 million. From 1986 to 1992, before coming to San Diego, he served as Chief Deputy for the Los Angeles District Attorney's Office. From 1983 to 1986, he served as Executive Director for the California District Attorneys Association directing governmental affairs and legislative action.

28. *Id.*

29. *Id.*

30. *Id.*

31. Roman, *supra*.

32. Ritter, *supra*.

Using DNA to Solve High-Volume Property Crimes in Denver: Saving Money, Lowering Crime Rates, and Making Denver Safer

by Simon Ashikhmin, Susan Berdine, Gregory LaBerge, Mitchell Morrissey, and Dawn Weber (Denver Burglary Project)

From October 2005 through September 2007, Denver participated in a five-site grant project¹ funded by the National Institute of Justice (the burglary project²). The aim of the burglary project³ was to explore whether DNA was a cost-effective tool for investigating and prosecuting high-volume property crimes such as home and commercial burglaries, car thefts, and car break-ins. The burglary project was a great success. In the two years of the project, the number of burglaries was reduced by 26 percent.

Historically, DNA had been used by law enforcement only for violent crimes. However, the overwhelming conclusion reached in Denver as a result of the burglary project was that using DNA to investigate and prosecute high-volume property crimes saved money, lowered crime rates (making Denver safer), and removed a substantial number of habitual criminals from the community.

This article addresses:

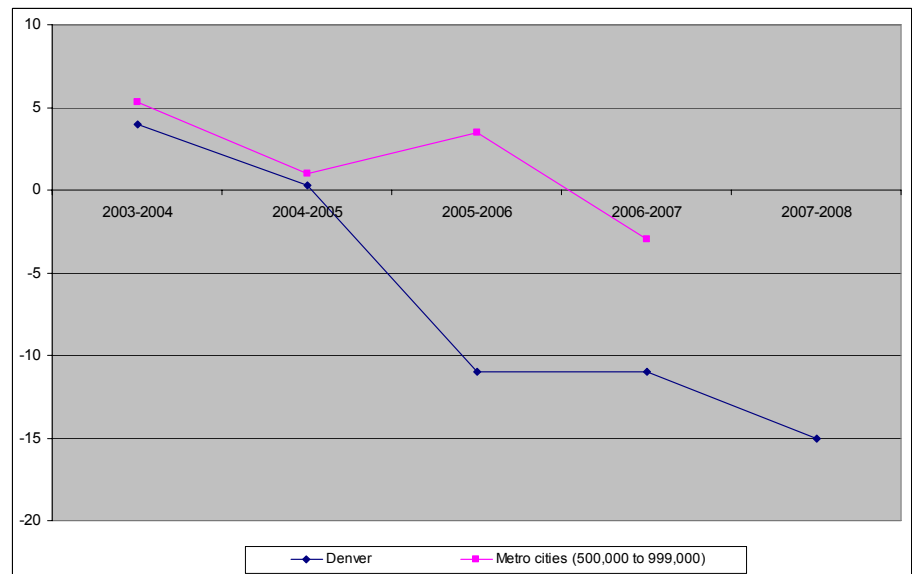
- The **effectiveness** of the burglary project (how many burglars were caught through DNA; how much crime was prevented by catching these burglars; how long their prison sentences were).

- The **cost-efficiency** of using DNA to catch habitual burglars (how much money was saved by using DNA to catch habitual burglars).
- The **best practices** developed during the burglary project (how best to investigate high-volume property cases with biological evidence; how to maximize outcomes through a triangle of collaboration between the police department, the crime lab, and the district attorney's office).

The success of the burglary project is best illustrated in Figures 1 and 2, which show that the systematic use of DNA evidence in investigating and prosecuting burglaries resulted in a pronounced drop in property crimes compared to similar metropolitan areas in the United States during the target period.

Figure 1: Percentage Decrease in Burglary Rate in Denver During the Burglary Project and Continuing into 2008

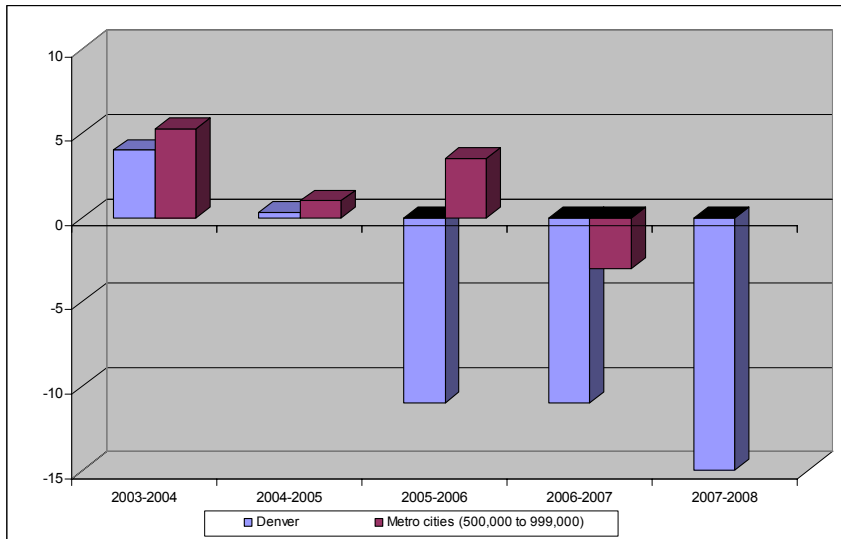
(line graph, no data for 2007–2008 is available for Metro cities from the FBI)



1. The other participating sites were Los Angeles, Phoenix, Topeka, and Orange County, California.
2. The National Institute of Justice contracted with the Urban Institute to produce a report on the burglary project as implemented in each of the five project sites. The detailed study produced by the Urban Institute may be viewed at <http://www.ncjrs.gov/pdffiles1/nij/grants/222318.pdf>. Additional detailed information regarding the project may also be found on the Denver District Attorney's Office website at http://www.denverda.org/DNA/Denver_DNA_Burglary_Project.htm.
3. The term "burglary project" is somewhat of a misnomer in that burglaries were not the only high-volume property crimes tracked in the project. Residential and commercial burglaries, along with car thefts and car break-ins, were also studied. However this phrase serves as convenient shorthand. Where "burglaries" and "burglary rates" are mentioned in this article, the authors intend to refer to only that specific type of crime.

Figure 2: Percentage Decrease in Burglary Rate in Denver During Burglary Project and Continuing into 2008

(bar graph, no data for 2007–2008 is available for Metro cities from the FBI)



The Nuts and Bolts of the Burglary Project

How DNA matches were obtained

Biological evidence such as blood, saliva, skin cells, hair, and urine were collected from crime scenes. This evidence (scene DNA) was analyzed by DNA experts within the Denver Police Department's Crime Lab. The experts developed a DNA profile that was then uploaded into CODIS, the combined DNA index system, a nationwide database maintained by the FBI.⁴ A DNA hit occurred when the scene DNA matched a profile in CODIS. A match could tie the scene DNA either to a known, named offender (offender hit) or could link to a profile of an unidentified offender from another unsolved case (case-to-case hit).

In the event of an offender hit, the case was immediately re-opened for investigation and, often, an arrest was made on the strength of the hit. Case-to-case hits often result in "John Doe" filings. A John Doe filing is an actual case filing (not just a warrant) made to keep Colorado's three-year statute of limitations from running out on property crimes, including burglary. A John Doe DNA filing simply inserts the perpetrator's DNA profile in the place where a known defendant's name would ordinarily appear in the charging document. Because the statute of limitations was preserved, these cases can be re-activated at any time in the future when an offender hit reveals the identity of the perpetrator. When a DNA match reveals the identity of the offender, the district attorney's office simply amends the charging document to reflect the

offender's name in place of his or her DNA profile. This change is referred to as converting the case from a John Doe filing to a known-defendant filing.

The number of cases included in the project and the number of CODIS hits produced by those cases

During the burglary project period from October 2005 through September 2007, more than 12,000 burglaries were committed in the City and County of Denver. The monthly average number of burglaries reported in 2006 and 2007 was about 500, with 6 percent (or 30 out of 500) cases having biological evidence.⁵ Six hundred DNA profiles were obtained from scene evidence and were uploaded to CODIS, producing 245 CODIS hits. In other words, 41 percent of profiles uploaded to CODIS produced hits.

There were 167 hits to identified offenders in CODIS. The remaining hits were case-to-case hits (in which matching DNA profiles were collected from unrelated crime scenes, but the identity of that offender remained unknown).

Of the 245 CODIS hits, there were 234 cases filed. Of these hits, 189 occurred in cases in which the sole means of identifying the perpetrator was through his or her DNA profile. There were 45 other cases filed in which DNA evidence was collected at the scene, but was in addition to other identifying information that revealed the identity of the offender. For example, in one case the suspect was caught leaving a burglarized home. His identity was thus established by the arresting officer. However, police also collected the burglar's blood from the sharp edge of a pried-open jewelry box inside the home. This case therefore featured a conventional means of

4. The profile was also uploaded into the Colorado state database, or "SDIS" (statewide DNA index system) and the local database, or "LDIS"

5. This percentage (6%) is consistent with the 4–9 percent range of property crimes studied in Britain in which biological evidence was recovered. Williams, R., *The Management of Crime Scene Examination in Relation to the Investigation of Burglary and Vehicle Crime*, London, Home Office (2004).

identifying the criminal, in addition to DNA evidence tying him to the inside of the residence.

Background information about Denver and the types of offenses that were tracked in the burglary project

Denver has a population of approximately 560,000, consisting of about 240,000 households. The Denver Police Department is comprised of approximately 1,500 sworn officers. The Denver District Attorney's Office has 81 trial deputies. Denver has a wide range of business and residential neighborhoods, including high-density urban neighborhoods, such as the Capitol Hill area, as well as old, established neighborhoods interspersed with businesses, such as the Highlands area in Northwest Denver and the Cherry Creek area. It also has high-density, mixed-use commercial and residential areas, such as the Lower Downtown area. Other areas, such as the Hilltop area, are almost exclusively residential.

Key personnel in the burglary project

The key personnel in the burglary project were:

- ♦ *The deputy district attorney.* The deputy district attorney had numerous roles in the burglary project. She made personal contact with the sergeant of the property crimes unit in each of Denver's six police districts, providing training and generally establishing a single point of contact between the police department and the district attorney's office on DNA-related matters. The deputy district attorney fielded phone calls from detectives across Denver, advising the detectives on issues ranging from evidence collection to how to convert a case from a John Doe case to a known-defendant case. The deputy district attorney also carried a full caseload

consisting of offenses with DNA evidence. Additionally, the deputy district attorney served as a liaison with the analysts in the crime lab, again serving as a convenient point of contact for communication between the district attorney's office and the lab.

- ♦ *Study coordinator.* The study coordinator was a single point of contact for the National Institute of Justice as well as the Urban Institute. The coordinator collected data as the project progressed and produced analytical and statistical monthly reports. These reports helped the deputy district attorney to identify trouble spots and weak links in the project implementation by police districts across Denver and to provide additional training to officers and detectives. The graphs contained in this article were created by the study coordinator, based on the compiled and analyzed project data.

- ♦ *Project DNA analyst.* The project DNA analyst was the grant-funded DNA analyst who focused exclusively on screening possible biological evidence collected from project cases, developing DNA profiles from that evidence (where possible), uploading CODIS DNA profiles, and following up on database hits.

- ♦ *Local CODIS manager.* In addition to being a full-time forensic DNA analyst, the local CODIS manager was responsible for the accuracy, security, and integrity of all DNA profiles entered into CODIS. The CODIS manager uploaded new forensic profiles to the state and national CODIS databases each week, evaluated all candidate forensic and offender hits, and notified investigators of any hits and investigative leads derived through CODIS.

- ♦ *Laboratory director.* The Denver Police Department's lab director oversaw all the DNA analysis done in connection with the project, including oversight of the grant-funded DNA-analyst position dedicated solely to analyzing evidence in project cases. The Denver Police Department's Crime Lab is in a unique position because it is an in-house lab focused solely on evidence generated in cases investigated by the Denver Police Department. It is not a statewide lab or a lab serving multiple law enforcement agencies throughout multiple jurisdictions. The working relationship between the lab, the Denver Police Department, and the Denver District Attorney's Office remained close and collegial throughout the project. Indeed, the lab director was a crucial link between the Denver Police Department and the District Attorney's Office, and played an active role in the success of the burglary project.

- ♦ *Street officers and detectives.* In Denver, patrol officers respond to 911 calls and prepare field reports such as offense reports and individual, narrative statements. They also collect evidence at the scene where appropriate (such as a bloody t-shirt left behind by a burglar who cut himself by smashing a window at the point of entry). The officers then place the evidence in property and turn over their case documentation to detectives in the property crimes unit. The detectives make sure that all relevant statements have been obtained and all relevant evidence collected. For the burglary project, the detectives served an important function by making sure suitable biological evidence was collected and submitted to the lab for DNA testing. The detectives were also responsible for doing the additional documentation when a John Doe

filing was converted to a named-defendant filing after a CODIS hit was made.

- † *Crime scene investigators.* Crime scene investigators were lab personnel who responded to scenes to collect DNA evidence (such as blood swabs from the dashboard of a car that had been broken into). These investigators were trained to recover the types of biological evidence with the highest likelihood of producing a DNA profile, such as blood (to be discussed in greater detail below).

Outcomes of the Burglary Project: The Effectiveness of the Project

Cases with DNA evidence were filed at significantly higher rates than cases that did not have DNA.

In Denver, when a detective determines that a particular case has one or more active leads, he or she will investigate those leads. If the leads are productive, the detective will complete the case filing. The detective then goes to the district attorney's intake office in police headquarters to present the case to a deputy district attorney.⁶ The detective makes an oral presentation of the case to the intake deputy, and the intake deputy then decides whether to accept the case for filing or to reject it.

Figure 3 shows that burglary project cases containing DNA evidence were eight times more likely to be presented by a police detective and accepted for filing by the District Attorney's Office than were cases that did not have DNA evidence.

Cases with DNA evidence resulted in pleas to the top charge far more frequently than cases in which there was no DNA evidence.

Figure 4 shows that the presence of DNA resulted in very favorable dispositions for

Figure 3: Court Filing Rate for DNA vs. Non-DNA Cases (by percentage)

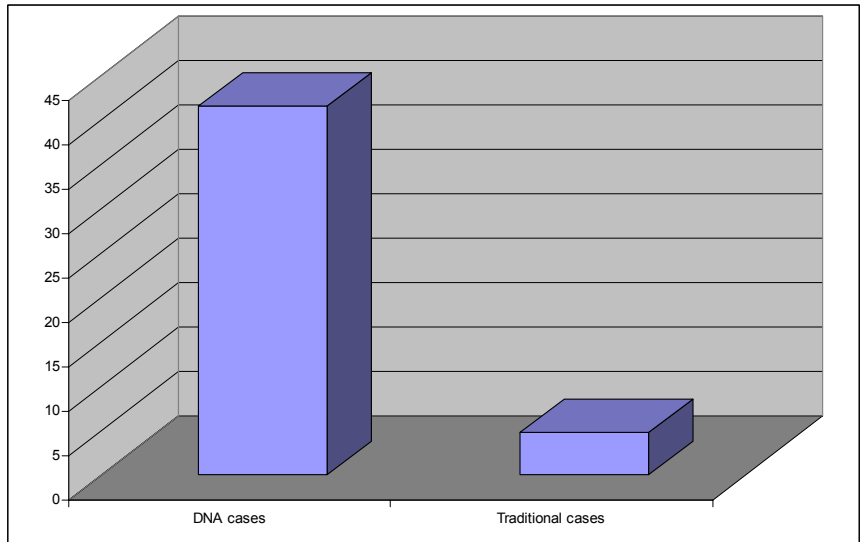
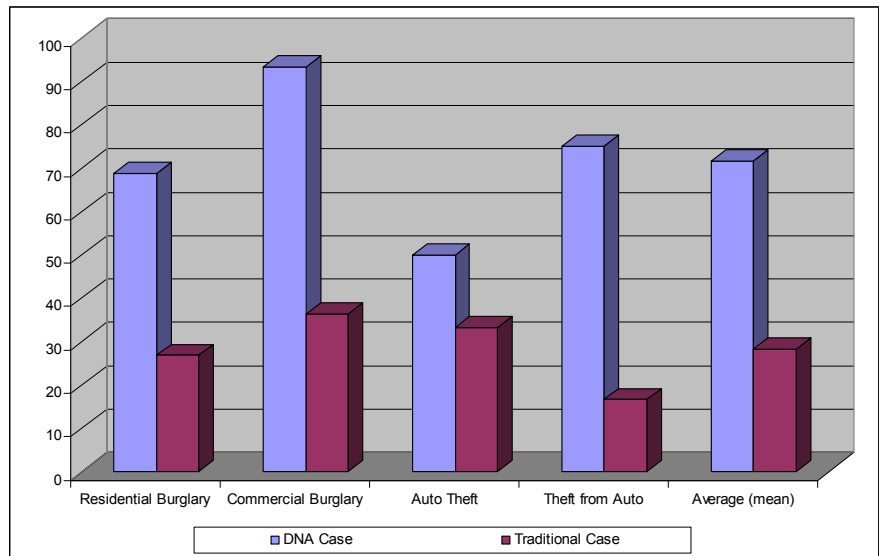


Figure 4: Percentage of Cases in Which the Defendant Pled to Top Charge in DNA vs. Non-DNA Cases



the prosecution to a far greater extent than property crimes in which the prosecution did not have the benefit of DNA.

An additional insight into Figure 4 is that many of the criminals caught by DNA evidence were career criminals with lengthy criminal histories and with multiple cases pending at the time of disposition of the DNA case. In addition to having

6. The detective often does not present cases that have no active leads to intake deputy district attorneys.

stronger cases because of the DNA, these factors—criminal history, plus more than one case pending—gave deputy district attorneys greater leverage in getting a plea to the top charge. Figure 4 also reflects District Attorney Mitchell Morrissey's policy—put in place at the beginning of the project—that habitual-criminal defendants would be required to plead to the top charge or else face the filing of habitual-criminal charges.

An example, both of the prolific nature of many of the serial burglars caught by DNA and of a leveraged plea to the top charges, is found in Denver defendant David Weller. Weller was a heroin-addicted serial burglar whose DNA was found in a DNA mixture along with that of his wife, Dina, on a cigarette found at a burglary scene. David testified at Dina's trial, admitting that he had committed as many as 1,000 burglaries in his criminal career. Dina was convicted at trial and was sentenced as a habitual criminal to a 36-year sentence. David pled in three separate burglary cases and was sentenced to 36 years, as well. After his sentencing on that global disposition, yet another CODIS hit was made on him and he now faces a mandatory 48-year prison term if he is convicted at trial of the substantive burglary offense and of the habitual-criminal charges.

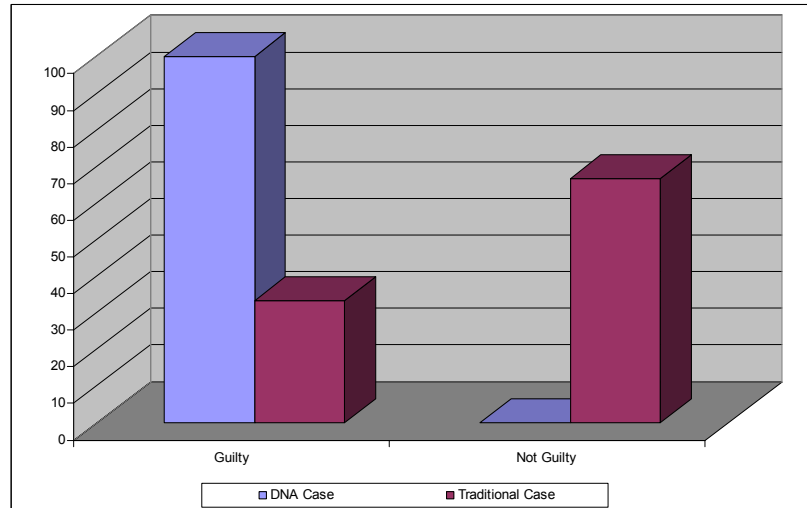
It is worth noting that the burglary rate in the neighborhood in which the Wellers committed their crimes dropped 40 percent after they were jailed. It is stunning that only two criminals could be responsible for that volume of home burglaries. However, the Wellers embody the project's findings that a relatively few number of criminals are responsible for a great volume of property crime.

Cases with DNA evidence resulted in convictions at trial three times more frequently than trials in which there was no DNA evidence.

Figures 3 and 4 show how the presence of DNA increases the likelihood

that a given burglary case will be filed and also increases the likelihood that such a filing will result in a plea to the top charge. Figure 5 shows the next step in this progression: that the presence of DNA substantially increases the likelihood of conviction at trial.

Figure 5: Trial Outcome in Residential and Commercial Burglaries in DNA vs. Non-DNA Cases (by percentage)



When interpreting Figure 5, it is important to bear in mind that:

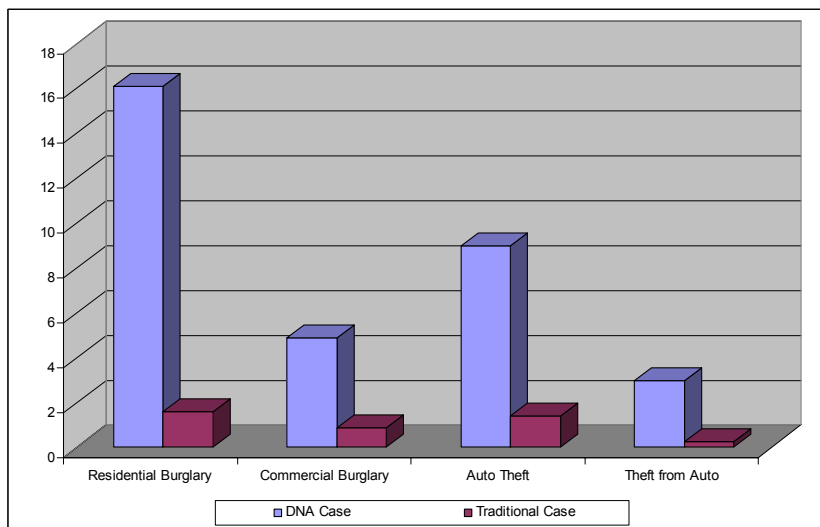
1. Each of the burglary project cases that was tried resulted in a guilty verdict; there was not a single acquittal; and
2. Because of the office-wide policy put in place by District Attorney Mitchell Morrissey (demanding a plea to the top charge in cases in which habitual-criminal filings were foregone), each of the project cases that was tried also included successful prosecution under the habitual-criminal statute. The result was the imposition of mandatory lengthy prison sentences for habitual criminals: three times the maximum in the presumptive range for offenders with two prior felonies, and four times the maximum in the presumptive range for offenders with three or more prior felonies.

Cases with DNA evidence resulted in prison sentences 10 times longer for home burglars and six times longer for commercial burglars than those obtained without DNA evidence.

Figure 6 demonstrates that the presence of DNA in a case was strongly tied to a lengthier prison term. The average length of a prison term for a defendant convicted without DNA evidence was 1.6 years. In contrast, defendants convicted at least in part because of DNA received an average sentence of 16.1 years, 10 times that for traditional home burglary convictions. For commercial burglaries, the average prison term with no DNA was only 10 months. With DNA, it increased to almost five years. For auto thefts, DNA-based cases resulted in an average prison sentence of nine years,

compared to only 1.4 years in traditional cases.

Figure 6: Length of Prison Term by Type of Offense in



DNA vs. Non-DNA Cases (in Years)

The same considerations that are relevant in interpreting Figure 4—lengthy criminal histories and multiple active cases pending at once—are also important in Figure 6. DNA evidence helped to catch serial offenders whose extensive criminal history warranted long prison terms (either standing alone or as a result of the filing of habitual-criminal charges). For example, serial burglar Robert Whitley, described below, was charged in a project case with a class 3 felony burglary of a dwelling and was also charged with five counts of habitual criminal. If convicted on all counts, he will be sentenced to a mandatory sentence of 48 years. Similarly, defendants Rodney Stearns and Jonathan Nelson, also described below, were also serial burglars. Stearns faced charges on two additional non-DNA burglaries, and Nelson faced charges for nine home burglaries and theft. Whitley, Stearns, and Nelson were typical of the repeat offenders captured and prosecuted during the burglary project.

Outcomes of the Burglary Project: The Cost-Effectiveness of the Project

Over the two years of the project, an estimated \$36.8 million in property loss was avoided and \$5 million in police costs were saved.

The estimated total savings of the burglary project was \$41.8 million. This figure represents property loss that did not occur because more than 95 habitual burglars (each of whom can be responsible for more than 200 crimes a year⁷) were captured using DNA. The figure also included the savings that occurred when police officers

did not have to respond to and investigate crimes that were estimated to have been committed had the habitual burglars not been in custody. Another way to express this is to say that 190 hours of investigation time was saved for each police officer in two years. Stated otherwise, there was a return on investment of more than \$90 for every dollar spent during the two years of the project.

To arrive at these figures, we analyzed the amount of time spent by each responding officer, each of the crime scene personnel, and the detective in responding to and working on each burglary and auto crime. The data showed that, on average, two police officers were dispatched to each of the above crimes; it took an average of 22 minutes for the officers to arrive; and once on scene, the officers spent 95 minutes there. At the pay rate of \$35 per hour, the cost of scene officer response was calculated at \$131. The average tally for the crime scene personnel consisted of 1.5 detectives spending 90 minutes at each scene to identify, document, and collect both fingerprint and biological evidence. At a pay rate of \$40 per hour, the crime scene personnel costs were \$90. The assigned detective was found to spend, on average, six hours per case (visiting the scene; obtaining surveillance camera footage; contacting suspects; tracing stolen property; filling out lab requests; arresting and interviewing suspects; and preparing a case filing). At the rate of \$40 per hour, that totaled \$240. The sum of these expenses (\$131 + \$90 + \$240) was \$461 for police response per burglary and auto crime.⁸

The actual figure for police expenses saved was calculated as the total number of burglaries and auto crimes prevented during 2006 and 2007,⁹ multiplied by the cost of police investigation for each case.

7. Chaiken, J.M. and Chaiken, M.R. *Varieties of Criminal Behavior*, Washington, DC: US Department of Justice, National Institute of Justice, 1982 (NCJ 87680):44.

8. These costs track those incurred by British law enforcement's property crimes investigations, each of which costs \$470 (adjusted to U.S. dollars from U.K. pounds sterling). Brand, S. and Price, R. *The Economic and Social Costs of Crime*, London; Home Office (2005).

That figure was 10,888 (cases prevented) x \$461 (cost of investigating each case) for a total of \$5 million.

Each \$1 invested in DNA forensics and related fields (such as police and lab training) resulted in more than \$90 of prevented police expenses and property loss. This quantitative measure of cost efficiency was obtained by dividing the total amount of property loss and police costs saved (\$41.8 million) by the forensic investment cost of \$462,000 (comprised of grant-funded lab, police department and district attorney training costs), yielding a cost efficiency of 90.5.

Best Practices Developed During the Burglary Project

As the burglary project progressed, certain best practices emerged. These practices related to key institutional relationships that needed to be built and maintained between the Denver Police Department, the Denver Police Department's Crime Laboratory, and the Denver District Attorney's Office; to certain types of field training that street officers and detectives needed to properly collect biological evidence and to document scenes with biological evidence; to follow-up investigative steps to be taken after a CODIS hit; to interview techniques of suspects following a CODIS hit; to proper documentation of John Doe filings; and to trial issues specific to CODIS-hit cases.

Best practice: The single most important feature that enabled the burglary project to be successful was the collaboration between the Denver Police Department Crime Laboratory, the Denver Police

Department detectives, and the Denver District Attorney's Office.

From the beginning, there existed a triangle of collaboration between the police department, the lab, and the district attorney's office. There was frequent and open communication between these three players, and there existed a shared notion that integration of DNA technology into routine police work could take habitual burglars off the street and make the introduction of DNA evidence at trial as routine for deputy district attorneys as the admission of fingerprint evidence.

The Denver Police Department's Crime Laboratory displayed a consistent commitment to the project. For instance, the department designated one of its burglary detectives, Detective Philip Stanford, as the DPD liaison for project issues and police training. Detective Stanford created an instructional video concerning DNA evidence collection that was played at roll call in police districts across the city. Additionally, Detective Stanford trained other detectives and street officers extensively and made other substantial contributions to the advancement of the project goals. These efforts included working closely with the deputy district attorney assigned to the project, including collaborating on the direction certain investigations would take to ensure the best plea disposition or trial outcome.

The lab consistently supported project goals by, for instance, training crime scene personnel, detectives and scene officers on the importance of proper recovery and handling of biological evidence. The crime laboratory attended not only to evidence collection procedures but also to whether

CODIS hits were being translated into filed court cases. The crime laboratory director made personal contact with the various police districts to ensure that the evidence analyzed by his staff was acted upon by detectives. Additionally, the lab cooperated with the district attorney's office and unfailingly had a "can do" attitude about preparing DNA evidence for court (often on very short deadlines).

Finally, the district attorney's office benefited from the police department's capable collection of the DNA evidence and the lab's expert analysis of that evidence to successfully prosecute scores of criminals. The deputy district attorneys resolved project cases with negotiated plea dispositions, often to the highest charge, and often with added leverage because multiple CODIS hits on serial burglars resulted in multiple cases pending against the same defendant at the same time. Additionally, deputy district attorneys successfully used habitual-burglar statutes and habitual-criminal statutes to obtain very lengthy sentences that effectively removed 95 habitual burglars from the community.

In summary, it was the creation of positive, collaborative, and professional relationship between each of the three points in the triangle that enabled Denver to improve its investigation and prosecution of high-volume property crimes with DNA evidence.

Best practice: The collection of blood and saliva at crime scenes yields the greatest number of uploadable CODIS profiles.

Of the 12,000 burglaries committed in Denver during the project, 510 cases with biological evidence were submitted to the lab for testing. Figure 7 shows the types

9. To arrive at a conservative figure for the cost of prevented property crimes, we used numbers showing the reduction in burglaries, motor vehicle thefts, and theft cases in Denver during 2006 and 2007 (available at <http://www.denvergov.org/HomePage/tabid/393800/Default.aspx>) and the corresponding costs from the FBI's 2006 Uniform Crime Report (available at <http://www.fbi.gov/ucr/>).

of biological evidence collected.

Of the 510 cases with samples, blood produced CODIS-quality DNA profiles 94 percent of the time. Samples containing saliva produced useable profiles 80 percent of the time. Samples that contained only cells yielded profiles 60 percent of the time. Samples from the remaining “other” category (consisting of feces, hair, urine, and semen, such as that found on discarded condoms) produced useable DNA profiles 58 percent of the time. These numbers are depicted graphically in Figure 8.

CODIS hits were obtained for more than 40 percent of blood and saliva DNA profiles, for 26 percent of cell-based DNA profiles, and for 35 percent of “other” DNA profiles (defined above as DNA from hair, feces, urine, and semen).

Best practice: Collection of “touch DNA” is less effective than the collection of blood and saliva, where available.

“Touch DNA” refers to cellular DNA left behind by a criminal who merely handles a particular item (without bleeding or sweating onto the item). For instance, in a commercial break-in case where a law firm’s desktop computers were stolen and the burglar moved items on the victims’ desks to gain access to the computers, the data did not support the collection of the moved items for DNA analysis. This is not to say that touch-DNA items should never be collected. Rather, it merely suggests an order of priority for collection where not all items can be collected.

Many law enforcement agencies face tight constraints on the DNA evidence that may be collected at a scene. For instance, a police department may not have crime scene personnel who can respond to a scene and collect certain samples. Or a lab may place a limit on the number of samples they will accept per case, thus causing the scene officer or

Figure 7: Types of Biological Evidence Collected (by percentage)

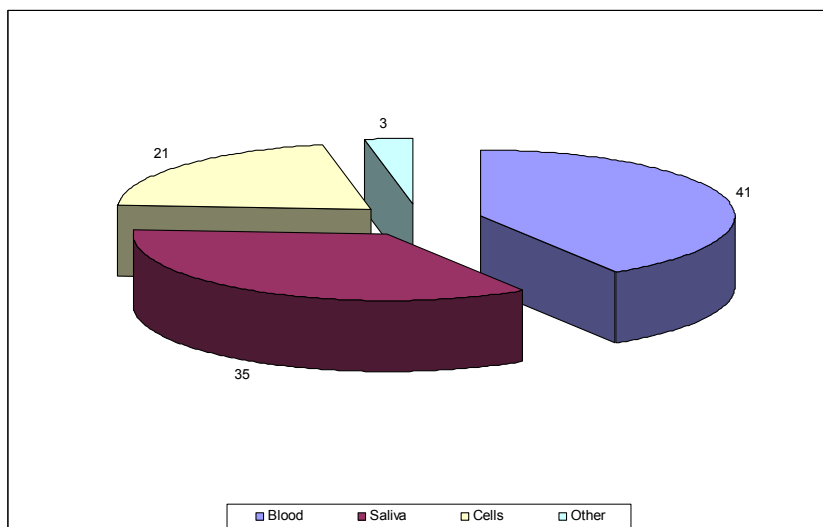
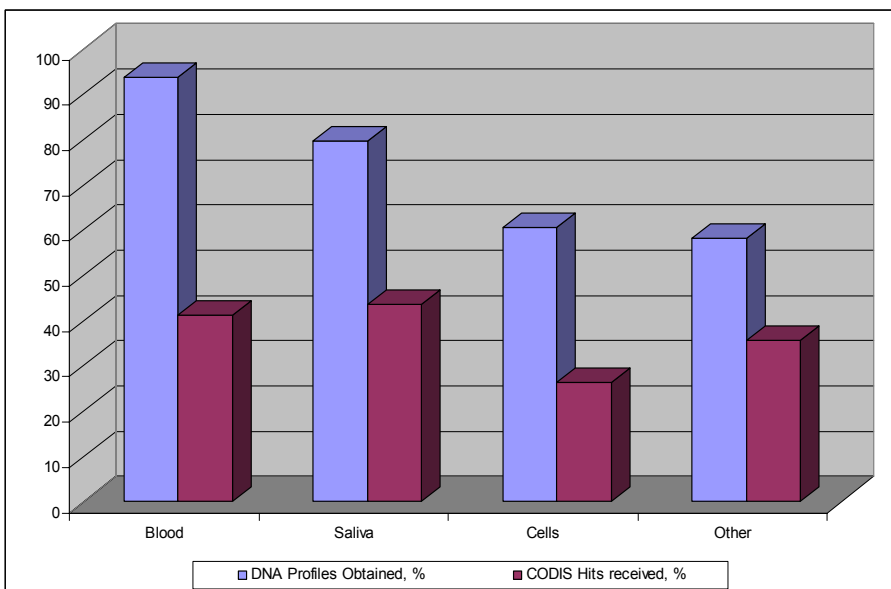


Figure 8: Proportion & Types of Samples Yielding CODIS Hits



detective to collect certain samples and leave others behind. These limitations are real and influence evidence collection every day. In view of these limitations, the Denver data suggests that the collection of blood and saliva should be emphasized over the collection of cells-bearing items and items possibly containing feces, urine and semen.¹⁰ Michael Davis left his saliva on a piece of “gold coin” candy

at a crime scene. Davis was linked to four other home burglaries by DNA he left at the scenes, as well as seven non-DNA burglary cases. Davis received a 48-year sentence. In another example, RazJohn Smyer would check his victims’ refrigerators and help himself to drinks. The soda cans he left behind provided enough DNA evidence to link him to five burglaries—he is now serving a 20-year

10. The relationship between semen recovered from a sexual assault examination kit and the development of a useable DNA profile is, by definition, outside the scope of the burglary grant. The authors do not imply that the statistic of 35 percent is applicable to those facts. Rather, the semen submitted for testing in the burglary grant was of the sort recovered from abandoned condoms left, for instance, in empty warehouses following a burglary or in some other type of uncontrolled environment subject to weather and degradation.

sentence in the Colorado Department of Corrections.

Best practice: Foreclose possible defenses by collecting evidence that definitively puts the defendant in the home, business, or car.

Blood evidence not only had the highest percentage of useable DNA profiles but also offered the greatest success in prosecution overall. This is because, unlike saliva on a portable item (such as a soda can) found at a burglary scene or in a stolen car, the blood (to use prosecutor parlance) “puts the defendant there.” Consequently, during the project, Denver deputy district attorneys often declined to file cases in which the DNA sample was found on a portable item that could have been introduced into the scene. Such portable items could include a mucous-bearing Kleenex that may or may not have been left by the culprit and may or may not have contained the culprit’s DNA (to the exclusion of all others). Another example is a beer can found in the kitchen of a home burglary that was not there before the break-in. The presence of the suspect’s saliva on the rim of the can is often not a sufficient guarantee, standing alone, to support a filing because the can was imported from outside the scene and could bear the DNA of a non-participant in the burglary.

In contrast, cases were filed in which food or beverages from inside the home were consumed by the criminal, with a DNA-laden portion left behind. An example of this is the case against Denver defendant Robert Whitley, who licked a lollipop during a home burglary and left it behind before fleeing. The lollipop was from inside the home; it was not imported from outside the scene.

Another example is defendant Jose Rodriguez who ate the victim’s chips and salsa and drank beers during the burglary, and left partially consumed chips behind, along with a saliva sample on a beer bottle.

Roilen Investor was captured through DNA after taking a bite from a tuna sandwich, spitting it back onto the plate,

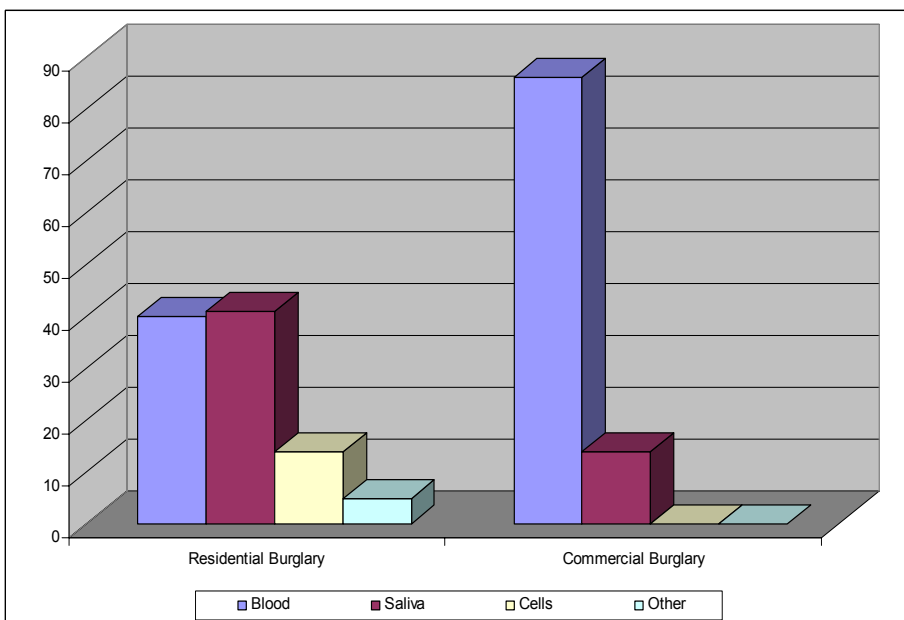
and returning it to the refrigerator in a home that he was burglarizing. The evidentiary value of such DNA-bearing items is great because the item was inside the crime scene and thus, puts the defendant at the scene.

Similar results were obtained in the cases of defendants Rodney Stearns and Jonathan Nelson. Stearns defecated in two homes and left behind the homeowner’s hand towels that he had wiped himself with. Nelson urinated on the victim’s clothes, in the victim’s home. All of these men were habitual criminals with numerous prior felony convictions.

One consideration in determining the probative value of DNA evidence was whether the location in which the biological evidence was found was private or public in nature. For example, a victim’s home is, depending on the lifestyle of the victim, often a place in which access is tightly controlled and the presence of a stranger’s DNA is inherently suspect. Thus, the presence of DNA in a victim’s

home generally carried greater evidentiary weight than, say, DNA in a stolen car that could have been passed between numerous users after it was stolen (in exchange for drugs, for instance) and that could contain cigarettes and beverage containers that did not necessarily come from the car thief. The relative evidentiary weight of the DNA in a given case was, therefore, contingent on a variety of factors unique to that case. The same could be said of quasi-public scenes such as construction sites where many workers are present each day, where the workers might change from day to day and where access to the site was loosely monitored. Moreover, in such cases, it is often hard to locate a single witness who can testify with certainty that the biological evidence was not there before the burglary but was there after. Figure 9 reflects how these considerations translate into filed burglary cases, both residential and commercial.

Figure 9: DNA-Based Court Cases By Type of Burglary and Type of Biological Evidence (by percentage)



Occasionally, DNA evidence of a suspect's presence outside a burglarized home can be paired with other evidence to support a filing. For example, when defendant Anthony Wright's blood was found outside a burglarized home, the case was refused for filing because there was no proof that Wright entered the home. However, when detectives tied Wright to pawn slips of items stolen in the burglary, the case was filed and Wright was sentenced to 12 years in prison.

Best practice: Police documentation of a crime scene must explicitly state the condition of the scene to show that the biological sample could only have been deposited by the offender.

Responding officers were trained to note the exact condition of the scene prior to the burglary or car break-in or theft. Officers were also trained to inquire of the victims whether the DNA could have been left by anyone but the perpetrator, and to include the victim's response in the crime scene documentation. For instance, in a case in which a cigarette butt was left in the kitchen of a burglarized home, the officer was trained to pin down the exact location of the butt on the floor (to shut down defense arguments that the butt had been there, perhaps in a less visible location, from a previous consensual visit); to confirm that there were no smokers who lived in or had been allowed in the house; and to document the precise condition of the scene the last time the victim was there (i.e., there was no butt present then, but one appeared after the burglary).

This bit of added scene documentation paid great dividends by closing doors on the defense. It also helped to refresh victims' and officers' recall of details when preparing for trial, often months or even years after the date of offense.

Best practice: After a CODIS hit, the detective should re-contact the victim with a photo lineup containing the CODIS-hit suspect to confirm that the victim did not know the suspect, nor did the victim ever consent to allowing the suspect into the victim's home or car.

Re-contacting a victim following a CODIS hit to show a photo lineup ensures that the victim did not know the suspect and had never consented to the suspect's presence in the victim's car or home. Including this step in the investigation avoids the filing of improper charges against an individual who had, for instance, been in the home with the consent of its owner prior to the burglary and had innocently left behind some type of biological evidence (saliva on a soda can or hair on a comb, for instance).

When administering the photo lineup, detectives should not ask the victim whether the victim sees the burglar in the lineup but rather, whether he or she knows anyone in the lineup. If the victim does not see anyone he or she recognizes, the case can proceed with ID being supplied by the DNA. If the victim does recognize the burglar, this identification can be admitted at trial and perhaps the victim can supply the detective with additional information that buttresses ID even further. For instance, the victim may say that the defendant is the clerk at the dry cleaners where the victim takes her clothes each week or that the defendant is her house-sitter or the clerk at the local grocery store. The detective could then follow that lead and, through employment records or otherwise, nail down that the defendant was in the area at the time of the offense and thus, had the opportunity to do the offense. Such investigation could also pin down that the defendant had first-hand knowledge of the victim's comings and goings and could time the burglary accordingly.

Where time and circumstances permit, the filler photos used in the photo lineup should consist not only of individuals whose physical appearance is like that of the CODIS-hit suspect, but of individuals of such appearance who were in custody on the date of offense. That way, if the victim mistakenly identifies someone other than the CODIS-hit suspect, the deputy district attorney could minimize that misidentification at trial by eliciting testimony from the detective that the victim was simply mistaken, and that the person identified by the victim could not have committed the crime because he was in custody on the date of offense.

Best practice: When interviewing the suspect after a CODIS hit, the detective should show the suspect photos of the neighborhood and the scene, and get the defendant to commit as to whether he or she is familiar with them.

The first principle of interviewing a suspect identified via a CODIS hit is not to reveal until the end of the Mirandized interview how he or she was identified. Rather, it is helpful to show photos of the neighborhood immediately surrounding the burglarized home. This forces the defendant to commit to the general statement of either being familiar with that neighborhood or not. Then, the detective can get more specific by showing photos of the exterior of the scene, again, pinning the defendant to whether he or she will claim familiarity with that place or deny it. Finally, the detective can narrow the focus even more by showing interior photos of the burglarized home and getting the defendant locked into that as well. Even when a suspect makes no overtly incriminating admissions, it is still extremely helpful to the case—and damning to the defendant at trial—for him or her to deny ever having been to the scene when the DNA proves otherwise.

Another interviewing technique often used if the suspect is becoming more guarded, is to disclose, in very vague terms, that some of the suspect's DNA was found at the scene and to invite the suspect to explain how it could have gotten there. Again, even if no incriminating statements result, the defendant is tied to an account of events that he or she has to stand by at trial or get impeached with if a different account is offered.

Best practice for John Doe filings: Have the detective obtain long-term contact information for the victim and document the case assuming that it could be many, many years before the case is re-activated via a CODIS hit.

The benefit of a John Doe filing is, of course, that the statute of limitations has been preserved. The practical effect, however, is that a John Doe case can be re-activated 5, 10, or even 50 years later. Thus, the challenge with such a filing is to document the case well enough that the case can be tried all those years later. To that end, detectives were trained to document a John Doe case differently, and more thoroughly, than the standard non-John Doe filing.

First, detectives were asked to get long-term victim contact information so that victims could be reached if they had left Denver by the time the CODIS hit was made. Some victims provided addresses for their parents, grandparents, or best friends. On more than one occasion during the project when a John Doe filing was converted to a known-defendant filing, detectives were able to contact out-of-state victims within one business day because they had obtained long-term contact information on the front end.

Second, in Denver it is commonplace for officers to simply summarize burglary victims' statements and not require the

victims to write out their own statements. However, such summarized officer statements often lack detail and offer little memory refreshment to victims who are called to testify many years after the offense. Accordingly, detectives were asked to obtain original statements from the victims so that a fuller account of events would be recorded and available for review should a CODIS hit re-activate the case many years down the road.

Third, detectives were trained to get receipts, insurance claim documents, and other supporting documentation from victims for damage done or items stolen so that the dollar value of the damage or lost item could be proven at trial, possibly years after an offense.¹¹ Since the passage of time can only make the gathering of those documents harder, detectives were instructed to get them at the time of the filing of the John Doe case.

Best practice for trial: Be prepared to enter into a stipulation or possibly purge any reference to the CODIS hit from your case.

There is a risk at trial that some trial court judges might deem it too prejudicial to tell the jury that the defendant was contacted by the police because of a hit in a database. The basis for such a ruling is that such information could imply that the defendant has a prior criminal history and, thus, was discovered via a criminal database. This best-practice tip is offered with the caveat that different judges could differ widely in their handling of this issue. Nonetheless, the tip is offered so that trial deputies will at least be alert to the possibility that the court may curtail prosecution witnesses in this regard. Such a ruling can certainly leave an awkward gap in the People's case (but not as awkward as a ninth-inning mistrial).

A common practice in Denver is for the People to offer the following stipulation to address this issue:

INSTRUCTION NO. _____

The prosecution and the defense stipulate to the following:

A DNA profile was developed from the blood found on the doorknob in the victim's home on November 28, 2007. As detectives continued investigating this matter, they received information concerning Mr. Burglar as a possible suspect. You are not to speculate or draw any conclusions as to what that information was. Based upon that information, the defendant, Mr. Burglar, was contacted.

This stipulation has been accepted by the court and the defense in each of the burglary project cases tried by the burglary project's deputy district attorney. It was her experience that the defense was uniformly receptive to the stipulation and that it was routinely accepted by the court.

Conclusion

DNA evidence is extremely helpful to law enforcement in catching high-volume serial property offenders. It helps to substantially lower property crime rates. Using DNA evidence is efficient; it catches serial burglars and takes them out of the community, usually for very long periods of time. It is also cost-effective; it saves \$90.50 for every \$1 spent. Using DNA evidence to catch serial property offenders saves many millions for cash-strapped law enforcement agencies, and saves home and car owners from sustaining costly losses.

11. In Colorado, the value of items stolen (such as a car or a car stereo) or the value of damage done to property is an element of an offense that must be proven at trial. For example, damage to the entryway of a burglary victim's home can support a class-4 felony criminal mischief charge if the damage exceeds \$1,000. In contrast, only a class-2 misdemeanor charge is warranted if the amount of the damage is less than \$500. (C.R.S. § 18-4-501(1).)

A less measurable, yet significant advantage of the burglary project is that it allows junior deputy district attorneys to litigate DNA-related motions and to admit DNA evidence at trial. In the past, deputies could only learn about DNA in high-stakes sex assault and homicide cases. With the burglary project, junior deputies can get experience with DNA in relatively lower-stakes cases such as car break-in and car theft cases.

Finally, another real, but hard-to-measure, benefit of the burglary project was the positive effect on the peace of mind of citizens. As all prosecutors know, property crimes generally—and home

burglaries in particular—have a deep and long-lasting impact on citizens' feelings of safety and well-being. The reduction in crime occasioned by the burglary project must be viewed in the fuller context of its impact on the quality-of-life of citizens in the community.

Simon Ashikhmin is a research supervisor in the Denver District Attorney's Office. He served as study coordinator of the NIJ-funded burglary project.

Susan Berdine is a forensic DNA analyst in the Denver Police Department's crime lab. She is also the lab's CODIS administrator.

Greggory LaBerge is the director of the Denver Police Department's crime lab.

Mitchell Morrissey is the Denver District Attorney.

Dawn Weber succeeded the Honorable Carlos Samour as the burglary project deputy in the Denver District Attorney's Office. She is now the senior attorney in the Cold Case Unit of the Denver District Attorney's Office.

The DNA Promise

by U.S. Representative Elton Gallegly (California 24th District) and The Honorable Gregory D. Totten, (Ventura County District Attorney)

DNA evidence has become the most powerful crime-solving tool available to law enforcement since the advent of basic fingerprinting technology more than a century ago. Yet the development of this powerful technology and the rapid expansion of DNA databases also present an extraordinary challenge for prosecutors.

Rarely will DNA results, standing alone, be sufficient to prove a defendant guilty. Chief Justice John G. Roberts recently touched upon this challenge:

DNA testing has an unparalleled ability to both exonerate the wrongly convicted and to identify the guilty...

At the same time, DNA testing alone does not always resolve a case. Where there is enough other incriminating evidence and an explanation for the DNA result, science alone cannot prove a prisoner innocent.¹

In many cases, DNA tells us who, but does not explain the where, when, and why of an underlying crime. These additional circumstances must still be proven and require the use of traditional investigative techniques and resources common in the vast majority of criminal prosecutions. The increasing success of DNA comparisons must be coupled with increased prosecution resources to bring to justice the perpetrators who are identified.

Expansion of DNA Comparisons

DNA is helping to solve more crimes by identifying more suspects in more cases. For example, a recent National Institute of Justice study on this subject compared burglary investigations using only traditional police practices with burglary investigations utilizing DNA evidence in four urban jurisdictions.² The results were surprising, as noted by criminal justice journalist Nancy Ritter:

[W]hen DNA was added to traditional property crime investigations: More than twice as many suspects were identified. Twice as many suspects were arrested. More than twice as many cases were accepted for prosecution.³

The study found that the collection and analysis of DNA at burglary crime scenes resulted in the identification of a suspect in 31 percent of all cases compared to the identification of a suspect in only 12 percent of the cases using traditional investigative techniques alone. The study also found that the suspects identified in the DNA-based investigations had an average of 5.6 prior felony arrests compared to an average of only 1.7 prior felony arrests in the backgrounds of traditionally identified suspects. Thus, not only did the use of DNA in burglary cases result in the identification of suspects more than twice that of traditional investigations, but the

suspects themselves were criminals with more extensive criminal histories.

This prospect of using forensic DNA analysis to solve more property crimes is certainly exciting, but most jurisdictions are simply not ready for widespread use of this most powerful investigative tool. Even today, in prosecuting homicide and sexual assault cases, DNA results are used in only a fraction of the total cases prosecuted.

Congress has tried to move the criminal justice system toward greater use of DNA to solve crimes. At the federal level over the last 15 years, no less than five laws have been enacted that serve to encourage and expand the use of DNA technology in the areas of forensics and database development.

In 1994, Congress enacted the DNA Identification Act, which modified the federal Omnibus Crime Control and Safe Streets Act of 1968 enabling funding for DNA laboratories and authorizing the collection of an index of DNA records and samples. The funding authorized by this Act expanded the ability of forensic laboratories to begin to build DNA extraction and analysis capacity.⁴

Two years later, Congress enacted the Crime Information Technology Act, which expanded the reach of the DNA Identification Act, by improving the interstate criminal justice identification, information, and communications aspects of forensic DNA analysis. The law funded programs that focused on the development of improved forensic techniques and the development of

1. *District Attorney's Office v. Osborne*, 557 U.S. ___, 129 S.Ct. 2308, 2312, 2316, citing *House v. Bell* (2006) 547 U.S. 518, 540–548.

2. Orange County, California; Los Angeles, California; Denver, Colorado.; Phoenix, Arizona; and Topeka, Kansas.

3. Nancy Ritter, "DNA Solves Property Crimes (But Are We Ready for That?)." *National Institute of Justice Journal*, Issue No. 261 (NCJ 224084), p. 2.

4. Public Law 103-322 (H.R. 3355).

automated database systems with which to compare various DNA results.⁵

In 2000, Congress enacted the DNA Backlog Elimination Act to expand, via grants to states, the development of local DNA databases linked to the FBI's national Combined DNA Index System, or CODIS.⁶

Most recently, in 2004 and 2005 the Justice for All Act and DNA Fingerprint Act were enacted to better define the role of DNA in not only helping resolve crime, but also to provide safeguards against the misuse of DNA by providing funding for postconviction DNA testing and authorizing a process for expungement of DNA profiles from CODIS.⁷

Despite this significant federal investment, local law enforcement struggles mightily to solve and prosecute "cold-hit" DNA cases. In Ventura County, from December 2003 to May 2009, the Ventura County Sheriff's Crime Lab received 955 cases requesting DNA typing. As of May 2009, 294 requested analyses had yet to be completed.

When the analyses are completed, they have borne fruit. DNA profiles from crime scenes are being compared with the DNA of known felons or those arrested on felony charges in state and federal DNA databases like CODIS, and matches are being made at an alarming rate. California's offender database is

currently recording over 300 cold-hit matches with known offender profiles per month.

Meeting the Prosecutor's Challenge

The very success of DNA matching creates additional burdens on prosecutors. Each match must be referred to a prosecutor to review, file, and prove. The cases may have been unsolved for years, and once the perpetrator has been identified through DNA, additional investigation is generally required in light of this new information. These newly solved cases add to prosecutors' already crushing caseloads. When DNA results are central to a prosecution, the case almost always demands more investigative and prosecutorial resources, not less. The prosecutor must develop competence to understand this scientific evidence and to present it effectively to judges and juries.

Thankfully, help is on the way. In 2006, H.R. 1602 (Gallegly) was introduced to authorize federal support for local prosecutors to pursue backlogged DNA cases. This proposal was ultimately incorporated into the Adam Walsh Child Protection and Safety Act. We were both in attendance at the White House Rose Garden when President George W. Bush signed the Act on July 26, 2006, and in doing so, established the framework to fund the prosecution of DNA-based

cases for the first time in the nation's history.

Representative Gallegly has secured preliminary approval for a pilot project to fund a dedicated team of prosecutors and investigators in Ventura County to work on backlogged DNA-based cases. Ventura County's pilot project will serve as a test case and model for funding similar prosecution efforts throughout the nation. We believe that the pilot project will demonstrate to lawmakers that additional investments in prosecution are necessary if we are to bring justice to the full range of cases now solvable with the aid of DNA. With these advances, we are hopeful that in the very near future the promise of DNA will truly be realized.

U.S. Representative Elton Gallegly has represented the 24th District of California (Ventura and Santa Barbara Counties) for 22 years.

Gregory D. Totten is a career prosecutor who joined the Ventura County District Attorney's Office in 1982. He was first elected District Attorney in 2002. He also has served as the Executive Director of the California District Attorneys Association, and was the founding Executive Director of the Institute for the Advancement of Criminal Justice.

5. Public Law 105-251 (S. 2022).

6. Public Law 106-546 (H.R. 4640), 42 U.S.C. § 14135a.

7. Public Law 108-405, House Report 108-711, and Title X of Public Law 109-162, respectively. The DNA Fingerprint Act also established authorization to collect a DNA profile from those arrested on federal charges.

Forensic Science and Human Rights Investigations

by Lance Gima, Chief of the Bureau of Forensic Services (retired), California Department of Justice

A commonly used definition of forensic science is “the application of scientific principles in the examination of physical evidence for legal purposes.” The work forensic scientists conduct on a daily basis—responding to crime scenes, testing biological material, analyzing trace evidence and suspected controlled substances, examining fingerprint and firearms evidence, and testifying in court—fit perfectly into that definition. The definition also fits perfectly for forensic scientists working on human rights (abuse/violations) investigations. Every day, somewhere in the world, forensic archaeologists, forensic anthropologists, forensic odontologists, and forensic pathologists are locating graves of the “disappeared,” exhuming a body or bodies from the graves, transporting the evidence to forensic laboratories, and conducting forensic examinations. Ultimately, their findings could one day be heard in legal proceedings.

Rarely do we in the United States feel that our human rights and freedoms have been abused or taken from us. Unfortunately, this is not the case in other parts of the world, and not so long ago or far from us. Political detentions and displacements were common in the 1970s and 1980s in Latin America. Many non-military citizens were illegally detained. Some were executed without trials (with bodies returned to families) and

many were not heard from again. Mass graves were uncovered, likely containing skeletons of these “disappeared” family members. Babies were taken after their parents were murdered, and were illegally adopted. Attempted genocide took place in other parts of the world. Tens of thousands of men, women, and children were found strewn about the country or buried in mass graves.

Criminal investigations have the purpose of determining what happened and by whom, and to bring those responsible to justice. Human rights investigations have a similar purpose. Forensic scientists assisting in human rights investigations attempt to identify the dead found in mass graves, to bring truth and specificity to the atrocities that occurred, to correctly document them for history, and to bring about justice. Although legal proceedings in the country where such killings occurred could happen, human rights violations will likely be addressed in other venues. Human rights violations can formally be charged under the Universal Declaration of Human Rights (a declaration adopted by the United Nations General Assembly) or other international human rights or humanitarian laws. Recently, forensic examination and testing testimony was given before the International Court of Justice at The Hague (also known as the World Court) in the trial against General Vlastimir

Djordjevic, who is charged with murder, deportation, and expulsion of Kosovo Albanians.¹

There are many examples of human rights abuses and violations that occurred in the past few decades that need forensic scientists to aid in the investigation. In Rwanda, the Hutus murdered 800,000 Tutsis and Hutu political moderates.² From 1992 to 1995, genocide of Bosnian Muslims was attempted by the Yugoslavian army.³ The death toll has been estimated to be more than 200,000 men, women, and children. In Argentina’s Dirty War, from 1976 to 1983, countless numbers of citizens were killed and up to 30,000 disappeared.⁴ In Chile, thousands of citizens were illegally detained and tortured, and many more killed, by Augusto Pinochet’s Caravan of Death.⁵ In Guatemala’s civil war, it is estimated that up to 50,000 citizens disappeared and thousands of children were orphaned.⁶ In El Salvador, a civil war resulted in the deaths and disappearance of thousands of non-military citizens, and approximately 40,000 were children separated from their families.⁷

To investigate human rights violations by incorporating forensic science to identify the disappeared from unidentified human remains or skeletons found in mass graves, organizations such as Physicians for Human Rights,⁸ the Argentine Forensic Anthropology Team,⁹ and the Guatemalan Forensic

1. “Vlastimir Đorđević Trial to Begin 27 January 2009.” Press Advisory, United Nations International Criminal Tribunal for the former Yugoslavia (January 23, 2009), <http://www.icty.org/sid/10042> (as of July 13, 2009).
2. “Genocide in the 20th Century. Rwanda 1994. 800,000 Deaths.” The History Place, <http://www.historyplace.com/worldhistory/genocide/rwanda.htm> (as of July 13, 2009).
3. “The Bosnian Civil War: 1992–1995.” Wars of the World, <http://www.onwar.com/aced/chrono/c1900s/yr90/fbosnia1992.htm> (as of July 20, 2009).
4. “Argentina Dirty War 1976–1983.” GlobalSecurity.org, <http://www.globalsecurity.org/military/world/war/argentina.htm> (as of July 13, 2009).
5. “Timeline: The Pinochet legal saga.” BBCNews, <http://news.bbc.co.uk/2/hi/americas/1209914.stm> (as of July 13, 2009).
6. “Guatemala Civil War 1960–1996.” GlobalSecurity.org, <http://www.globalsecurity.org/military/world/war/guatemala.htm> (as of July 13, 2009).
7. “El Salvador Civil War.” GlobalSecurity.org, <http://www.globalsecurity.org/military/world/war/elsalvador2.htm> (as of July 13, 2009).
8. <http://physiciansforhumanrights.org/> (as of July 13, 2009).
9. Argentine Forensic Anthropology Team (EAAF), <http://www.eaaf.org/> (as of July 13, 2009).

Anthropology Foundation¹⁰ were formed in the late 1980s and early 1990s. These organizations were largely comprised of forensic pathologists, forensic archaeologists, and forensic anthropologists.

The work of the human rights forensic scientists during this period consisted of locating the grave sites, establishing the size and depth of the grave, documenting the content of the graves and all activities at the site, carefully removing the human remains, packaging what was collected, and transporting the evidence to a laboratory. At the laboratory, the human remains were examined, trauma to the bones was documented, and the cause of death was determined when possible. The anthropologists attempted to re-associate the skeletal remains, which became very complex in mass grave situations. Age, sex, and stature of the victim were determined when possible. Teeth were useful in age determination, but since X-rays or pre-death or ante-mortem dental information was rarely available, the teeth did not provide identification information. Therefore, along with the anthropological information, cultural evidence such as clothing and personal effects found in the grave was useful in the identification process. Information regarding physical descriptions of the disappeared family member, along with descriptions of clothing and personal effects, was provided to the forensic investigators during interviews with family members. This ante-mortem data along with other investigative information established through interviews with witnesses to the killings or burials sometimes led to identifications of the skeletons found in the graves. However, it was not until DNA technology moved

toward more discriminating genetic marker systems in the late 1990s, that DNA could assist or even replace the "Anthropology Led Identifications."

The International Commission on Missing Persons (ICMP) Laboratory began using DNA technology in late 2001 to identify the remains from the attempted genocide of non-Serbs in Bosnia-Herzegovina and conflicts in Croatia, Kosovo, and Macedonia. The ICMP soon became leaders in "DNA Led Identifications." Currently posted on their website,¹¹ the ICMP has recorded the analysis of 25,033 bone samples leading to 12,520 identifications of different individuals. These identifications were possible due to the collection and analysis of 69,051 family reference samples.

The ICMP's reliance on DNA technology for identifications does not minimize the importance of the work conducted by all forensic scientists involved in the human rights investigation. Forensic pathologists must still attempt to determine cause of death. Anthropologists have the responsibility of piecing together the hundreds of bone fragments found in a mass grave into specific individuals and are often requested to select the best bone sample for DNA testing. Perpetrators of human rights violations often attempted to keep secret the location of the mass graves by digging up skeletons from the initial burial site and re-burying them at another location. It is the anthropologists who must try to reassemble the human skeleton even if bones are coming from different locations. Without all professionals working as a team, identifying the disappeared, establishing and documenting the specifics of the

atrocities for history, and the presentation of these findings in a legal proceeding could not be successful.

In 1994, Dr. Robert Kirschner, of the Boston-based organization, Physicians for Human Rights, employed DNA technology to confirm the association of a child abducted by the El Salvadoran military to the child's surviving family. Dr. Kirschner wrote:

In a field where we have so often used science to document death and devastation, this type of program gives us the opportunity to provide a life-affirming service. The abduction of children constituted a serious human rights violation that now, after all these years, we can help resolve.¹²

Dr. Kirschner's strategy of relying on DNA was expanded in 2004 by a group of volunteers from the California Department of Justice (DOJ). In 1994, the DNA testing employed could only confirm a child-family association established by traditional investigative procedures. The DOJ volunteers developed a new strategy that would employ the latest DNA technology and build a database so that it could be searched when nothing but a DNA profile was available.

Working with the El Salvador organization, ProBusqueda,¹³ the Physicians for Human Rights, and the University of California Berkeley Human Rights Center, the DOJ volunteers developed a four-phase strategy to incorporate DNA testing into the search for the missing children of El Salvador. The phases included a family interview/sample collection phase. An information

10. Jardin, Xenii. "Group Works to Identify Remains in Guatemala." NPR (Jan. 29, 2007), <http://www.npr.org/templates/story/story.php?storyId=7019560> (as of July 13, 2009).

11. "DNA Results of the International Commission on Missing Persons Reveal the Identity of 6,186 Srebrenica Victims." International Commission on Missing Persons, News Release (July 9, 2009), <http://www.ic-mp.org/press-releases/dna-results-of-the-international-commission-on-missing-persons-reveal-the-identity-of-6186-srebrenica-victims-dnk-izvjestaji-medunarodne-komisije-za-nestale-osobe-icmp-otkrili-identitete-6186-sreb/> (as of July 13, 2009).

12. "Physicians Launch DNA Testing to Reunite 'Disappeared' Salvadoran Children with Parents." Physicians for Human Rights, Press Release (Sept. 13, 1994), <http://physiciansforhumanrights.org/library/1994-09-13.html> (as of July 13, 2009).

13. "What is ProBusqueda?" ProBusqueda Association, <http://probusqueda.org/index.php?module=htmlpages&func=display&pid=14> (as of July 13, 2009).

database founded on interviews with families reporting disappeared children was established during this phase, along with training of ProBusqueda staff in collecting cheek or buccal cell samples. The next phase involved more than 20 DOJ volunteers working evenings and weekends analyzing the collected family-reference samples and samples acquired from young adults who were believed to be separated from their families during the El Salvadoran conflict. Phase three of the project introduced the software program, DNA-View, which calculates kinship probabilities of suspected children with families in the DNA family reference database. The final phase included training an El Salvadoran forensic scientist to take over for the DOJ volunteers in searching the database and writing reports.

This program has been extremely successful. The first reported success of the program was the confirmation of the association of a University of California Davis student, adopted by a Berkeley couple as a baby, to an El Salvadoran family in the DNA database. Other successes followed, including one that confirmed the value of the DNA database searching strategy implemented in the ProBusqueda Project. A young man who contacted ProBusqueda stated that he was adopted as a baby and was looking for his biological parents. After analyzing his sample, a cold search of the DNA database was conducted. After “hitting” a family in the database, the family was contacted and confirmed that a baby boy was separated from their family. They had never mentioned that they had a missing son to ProBusqueda, because they assumed he had died during the conflict.

The success of this project demonstrates the effectiveness of the strategies employed, and can be a

blueprint for other human rights projects. Many of the DOJ volunteers have since organized into a non-profit group known as the Alliance of Forensic Scientists for Human Rights and Humanitarian Investigations. The Alliance is currently working on a project similar to the ProBusqueda Project helping adults, adopted as children by couples in the United States, make contact with their families in South Korea.¹⁴

As with crime in the United States, a decrease in forensic science investigations of human rights violations would be welcomed. Unfortunately, the exhumation of bodies from mass graves continues today in Cyprus, East Timor, Guatemala, and elsewhere, while the daunting task of exhuming mass graves from the conflict in Iraq and Darfur is on the horizon. Additionally, a recent United States grant solicitation for proposals to employ forensic science to address the sexual violence that is out of control in the Congo (and elsewhere) underscores the need for an increase in forensic science training and laboratory services to assist human-rights investigations around the world.

Meeting the growing forensic science demands in human rights investigations is not simple. Many human rights organizations are trying to add DNA units or contract with universities and the growing number of private laboratories. Just as in the United States, forensic science can be jolted by the mistakes of a few. In Chile, a misidentification by an anthropologist was uncovered in the mid 2000s. The misidentification was caused by the use of a technique not thoroughly understood or validated in the Chile Anthropology Laboratory. This error convinced Chilean President Michelle Bachelet to convene a panel of international experts to assist in the assessment of the human rights

forensic science services in Chile. Along with the anthropology unit, problems were also uncovered in the DNA unit. Recommendations of the panel led to a reorganization of the forensic services units and outsourcing of much of the forensic science human rights work until accreditation could be attained.

As we in the United States tackle the recommendations of the National Academy of Science Report,¹⁵ forensic scientists working in other countries must do the same. Since there is room for additional forensic science disciplines to be utilized in human rights investigations such as firearms examinations (establishing the type of firearm used or even linking bullets and cartridge cases to different graves) and latent prints (on mummified, decomposed, or burned bodies), the use of validated procedures, proper documentation, proper training, and even proficiency testing must also be embraced. Informing a family that the human remains returned to them is not that of their loved one is a scenario that must be avoided.

Lance Gima is the retired Chief of the California Department of Justice Laboratory. He is a former member of Chile's Presidential Commission on Human Rights, a forensic science consultant to Chile's Medical Legal Service, a forensic science consultant to Proderecho, founder and co-chair of the Board of the Alliance of Forensic Scientists for Human Rights and Humanitarian Investigations, and an advisory board member for the University of California Berkeley Human Rights Center.

14. “The Power of DNA.” Korean DNA Match Service, http://www.koreandnamatch.com/en/power_of_dna.html (as of July 13, 2009).

15. *Strengthening Forensic Science in the United States: A Path Forward*—2009. National Academy of Science, Report (2009).

Familial Searching: From Data Bank to Missing Persons

by Jill Spriggs and Michael Case (California Department of Justice)

The California Department of Justice, Bureau of Forensic Services provides services to the citizens of California in a variety of areas. None are so rewarding as helping to solve a case or confirm a deceased person's identity.

Offender and arrestee samples are analyzed every day at the Jan Bashinski DNA Laboratory located in Richmond, Calif. Each day local law enforcement agencies submit offender and arrestee samples in the hopes of solving an unsolved case such as a burglary, sexual assault, or homicide. These samples are analyzed and uploaded into CODIS (Combined DNA Index System) otherwise known as the CAL-DNA Data Bank. The BFS Jan Bashinski DNA Laboratory has the fourth largest DNA database in the world with more than 1,200,000 convicted offender and arrestee DNA profiles and a hit rate of more than 300 hits per month to forensic cases. Each month the BFS Jan Bashinski Laboratory processes up to 25,000 and 30,000 offender/arrestee samples. Weekly, offender/arrestee sample DNA profiles are uploaded to the DNA database and searched against forensic evidence DNA profiles from crime scenes submitted by local California crime laboratories and the rest of the nation.

If a match is made between a forensic evidence DNA profile and an offender or arrestee DNA profile, the hit is dispositioned by the local crime laboratory that submitted the evidence profile. If the case is unsolved, CAL-DNA Data Bank staff pulls the offender sample that hit to the forensic casework DNA profile and reruns it. After confirming the original results and

match, the CAL-DNA Data Bank issues a hit notification letter to the local crime laboratory, identifying the offender hit by name and state identification or CII number as an investigative lead in their unsolved case. In addition, the letter directs the local laboratory to notify the law enforcement agency to request a new sample, collected under a chain of evidence, as an additional confirmation of the match and for presentation in court. This hit-confirmation process typically takes about two weeks from the time of the hit to the issuance of the hit notification, but this can be done more quickly if the unsolved case requires it.

Familial Searching-Forensic Casework

For the first time, there is an avenue to also use the California Department of Justice CAL-DNA Data Bank to determine if one of the convicted offenders included in the database could be a relative of the perpetrator who is the source of the forensic evidence profile. As of April 2008, the California Attorney General has issued a Familial Search Policy. The policy requires that the following conditions must be met to perform and release the results of such a search:

- The law enforcement agency attests that all other investigative leads have been exhausted.
- The law enforcement agency and the prosecutor's office commit to further investigate the case if the name of a potentially related offender is released as a result of the familial search.

- The forensic evidence DNA profile to be searched is a single-source profile.
- Prior to the search, Y-STR¹ typing of the forensic evidence that yielded the single-source profile has been completed by the submitting agency or crime laboratory.

The goal of the California Department of Justice familial search policy is to strike an effective balance between privacy concerns and the need to provide information that may solve a violent crime or series of crimes. To meet this goal, the department has established rigorous scientific protocols and review procedures.

How does this familial searching work? With the help of a specially written and tested "ratiometer" program, the computer search not only looks at allele² matching or sharing between the forensic evidence profile and the offender profile, but also the rareness of the identified shared alleles. The ratiometer performs a statistical calculation for each of the more than one million offender DNA profiles in the DNA database in comparison to the forensic evidence profile. This generates a ranked list of candidates (approximately 200) who could statistically be relatives of the potential perpetrator and source of the forensic evidence profile based on their "kinship likelihood ratios." The highest ranking offender candidate samples are pulled from storage and re-analyzed for Y-STR type.

Y-STRs are inherited paternally, so, for example, a father and son will have the same Y-STR profile. The Y-STR

1. Y-STR typing is a short tandem repeat on the Y chromosome.

2. An allele is a one member of a pair or series of genes that occupy a specific position on a specific chromosome.

profiles of the convicted offenders on the list are compared to the submitted Y-STR profile of the unsolved case evidence. If a further match is found, the offender may be a male relative of the perpetrator and source of the evidence profile. If there are no matches between the Y-STRs of the candidate pool of offenders and the evidence profile, a letter is issued to the law enforcement agency stating that no relatives were identified in the DNA database at this time. The submitting agency is advised that, as more convicted offender samples are added to the database, the familial search could be conducted again, sometime in the future.

If there is a Y-STR match, the Familial Search Committee meets to discuss disclosing the name for follow up by the Bureau of Intelligence and Investigation (BII) of the California Department of Justice. Once the name is given to BII, special agents investigate whether or not the offender candidate could possibly have a relative and whether that relative is a viable suspect who could have been around at the time of the crime. If BII determines the offender candidate has or may have viable relatives, the committee meets again to evaluate the lead and the benefit of disclosing the name of the offender candidate to the requesting law enforcement agency.

Familial Searching for Missing Persons

The Missing Persons DNA Program (MPDP) faces similar issues in the identification of human remains, and so also has similar software for performing kinship analysis to search for relatives of missing persons. This software although similar to that used in the familial searching of forensic evidence profiles, has a different database index specifically designed and used for identifying relatives of missing persons, with legally specified internal controls limiting its use.

The MPDP program receives many different types of cases, but all have one common theme, the need to identify an unidentified person or to identify

The goal of the California Department of Justice familial search policy is to strike an effective balance between privacy concerns and the need to provide information that may solve a violent crime or series of crimes. To meet this goal, the department has established rigorous scientific protocols and review procedures.

human remains. Below are three very different, but exemplary cases:

- On September 11, 1971, a young unidentified woman was found stabbed to death in the Delta-Mendota Canal in Stanislaus County. She had been brutally murdered with 65 stab wounds to her chest. She remained unidentified for 37 years, until her body was exhumed in 2008 as part of a cold-case investigation. As of this writing, her homicide remains unsolved.
- On September 3, 2007, Steve Fossett, a famous multimillionaire aviator, was reported missing after piloting a single engine Super Decathlon airplane from a private airstrip in Nevada into California's Sierra Nevada Mountains. More than a year later, on September 29, 2008, a hiker found Mr. Fossett's remains near the wreckage of his airplane.
- On May 14, 2008, an indigent elderly man was found dead in a rundown Los Angeles hotel room. He had apparently died of natural causes. This man seemingly had no family, no friends, and was of very limited financial means. One of the other

hotel tenants told the police that he once remembered the man telling him his name, which the tenant gave to the police.

One person was murdered; one person died as a result of an airplane accident; and one person apparently died of natural causes. One person had led a middle-class lifestyle; one person was a multimillionaire; and one person was indigent and relegated to the lifestyle of a resident of a skid-row hotel. But all three were identified by the MPDP Program. And each of these persons had family members who cared for them and loved them. Identifying these people represents an important public service provided by the California Department of Justice—a service that is afforded to all citizens of California irrespective of their circumstances, their financial means, or social status.

In the example of the murdered woman found in Stanislaus County, the MPDP determined through comparison of mitochondrial DNA to two of the woman's cousins, that she was Mary Alice Willey from San Francisco. Ms. Willey had become associated with radical criminal elements in the early 1970s. Law enforcement officials agree that her identification could renew the investigation with the hopes of identifying and bringing to justice her killer or killers.

These "last hope" identifications are often the only means of solving cases that are gripping the nation, as was the case in Steve Fossett's disappearance. The search for Mr. Fossett culminated with the largest aircraft search in the history of civil aviation. Satellites were repositioned and thousands of people used the Internet to join the world's "search party" to look for the missing aviator. Despite this huge effort, Mr. Fossett's remains were not found until more than a year later by a lone hiker. Mr. Fossett's identification by the MPDP was national news and helped his family to close a painful chapter in their lives.

In the example of the elderly man who died in his hotel room, MPDP staff spoke to the man's sister now living in Pennsylvania. She said, "For 40 years, I have wondered what ever happened to my brother, and all these years I wondered if I would ever get a phone call about him." She then stated, "You are that call." She went on to say that she does not have many years left and she is relieved that she can live her remaining time knowing what happened to her brother.

These three real-life examples are representative of nearly 3,000 California unidentified deceased-person cases that have been reported to the California Department of Justice. Nationwide, it has been conservatively estimated, there are more than 40,000 unidentified deceased persons lying in morgues, or buried in pauper's graves marked John or Jane Doe. In some cases, there is no marker at all. California has always been regarded as a leader with the most comprehensive missing and unidentified person reporting laws in the nation. In California, "it is the duty of all law enforcement agencies to immediately assist any person who is attempting to make a report of a missing person or runaway."³ Many other states do not yet require law enforcement agencies to even accept reports of missing adults. California coroners and medical examiners are mandated to report to the Department of Justice any deceased persons that they are unable to identify, no later than 180 days after discovering the remains.⁴ Many other states do not yet require coroners or medical examiners to report unidentified deceased persons to any state-level clearinghouse.

In 2000, California again led the nation by passing Senate Bill 1818, which established the California Missing Persons DNA Program. This law was intended to test the usefulness of DNA to identify persons who could not be identified by more traditional methods including identification by family viewing, from physical features, by fingerprints,

or by dental characteristics. The MPDP was funded with a \$2 fee that was added to each death certificate issued in California. This law contained a "sunset" clause so that the funding and the fee expires on January 1, 2010. Assembly Bill 275 in the current legislative session would remove the current sunset provision and permanently establish the \$2 death certificate fee that funds the program. California's budget crisis makes the passage of any fee-based bill difficult. However, it is important to note that the MPDP receives unidentified-person cases after local coroners and medical examiners give up all hope of identifying these unknown persons. These "last hope" identifications give grieving family members the resolution they need to know what happened to their loved ones and are often the key to solving homicide cases. Government has no higher calling than to protect its innocent citizens, and AB 275 is crucial to provide the California Department of Justice and other criminal justice agencies the resources to continue to help solve homicide cases and bring murderers to justice.

There are many thousands of other family members in California and across the nation who, like the woman whose long-lost brother was identified, are also waiting for "that call." Many of these unidentified persons are murder victims, and their identities may be the key to help solving their cases and bringing their killers to justice. Whether a person's identification leads to a solved homicide case or is simply a relief for an elderly man's sister, AB 275 will enable California's coroners and law enforcement agencies to continue to make "that call." It is now more critical than ever that AB 275 becomes law to ensure that California's law enforcement agencies, coroners, and ultimately its citizens continue to have access to the resources that have helped unlock the mysteries of many "last hope" identifications.

In September 2008, Governor Schwarzenegger vetoed a similar bill (AB 1975) citing: "The Legislature could use next session ... to pursue the effort to permanently establish the death certificate fee." It is now well into 2009, and the time has come for the Legislature and the Governor to respond and preserve the resources that have proven of great value, not only to homicide investigators and the public, but to grieving family members longing to know the fate of their missing loved ones. AB 275 also will allow California to maintain its leadership role nationally, so that other states can begin to resolve the 40,000 unidentified-person cases and help the associated families and loved ones to also someday receive "that call."

Jill Spriggs, Chief of the Bureau of Forensic Services, began her 19-year career in forensic science in Phoenix, Ariz. In 1992, she joined the Sacramento County District Attorney's Laboratory of Forensic Services. As technical leader for the laboratory, she performed the DNA analysis on the first solved John Doe warrant case in the United States. In 2001, she accepted a position as assistant laboratory director/technical leader of the DNA section at the California DOJ Bureau of Forensic Services, Sacramento Laboratory. Prior to this, she held positions as DNA technical leader for the Central Valley and Fresno Laboratories; laboratory director/quality assurance manager; and assistant bureau chief.

Michael Case is a deputy attorney general assigned to the Missing Persons Section at the Attorney General's Office.

3. Penal Code § 14210(a).

4. Govt. Code § 27521(g).

People v. John Doe: Putting a Face to a DNA Profile

by Anne Marie Schubert, Deputy District Attorney, Sacramento County

The Origin of John Doe DNA

For nearly six years, Sacramento Police Detective Pete Willover kept one case sitting on his desk. Every year, on the anniversary date of that violent home invasion rape, Detective Willover called the victim to let her know that he still cared, that he was still investigating, and that he would not file the case away until he found the rapist.

In *As You Like It*, William Shakespeare said, “Time is the justice that examines all offenders.” While this is often true in cold cases, true justice may be lost if the offender is not prosecuted in a timely fashion.

For 24-year-old Deborah L., this meant that her rapist would go free if the man who broke into her apartment, threatened her with a knife, and sexually assaulted her on August 25, 1994, was not identified and prosecuted within six years¹ of her crime. The reality was simple: Time was running out.

In an effort to find some hope, Detective Willover contacted the Sacramento County District Attorney’s Office on December 1, 1999, wondering if there was anything that could be done. As Detective Willover said, “The property warehouse is going to destroy the rape kit if we don’t prosecute this case.”

Coincidentally, within weeks of Detective Willover’s call, a local newspaper ran a story on a Wisconsin case in which the Milwaukee County District Attorney issued a warrant for the arrest of “John Doe” who was only identified by a genetic code. The warrant was issued a few weeks before the expiration of the statute of limitations.

And so began California’s first arrest and conviction based upon a John Doe DNA warrant. Just 10 days before the statute of limitations was set to expire, a DNA profile of the rapist was developed from the sexual assault kit collected during the victim’s forensic medical examination.²

Armed with this DNA profile, the Sacramento County District Attorney’s Office filed Felony Complaint 00F06871 on August 22, 2000:

People of the State of California v. JOHN DOE,
unknown male with Short Tandem Repeat (STR)
Deoxyribonucleic Acid (DNA) Profile at the following
Genetic Locations, using the COfiler and Profiler Plus

Polymerase Chain Reaction (PCR) amplifications kits: D3S1358 (15,15), D16S539 (9,10), THO1(7,7), TPOX (6,9), CSF1PO (10,11), D7S820 (8,11), vWa (18,19), FGA (22,24), D8S1179 (12,15), D21S11 (28,28), D18S51 (20,20), D5S818 (8,13), D13S317 (10,11), with said Genetic Profile being unique, occurring in approximately 1 in 21 sextillion of the Caucasian population, 1 in 650 quadrillion of the African American population, 1 in 420 sextillion of the Hispanic population.

At the time the complaint was filed, an arrest warrant was also issued charging “John Doe” with multiple counts of sexual assault.

On September 1, 2000, the DNA profile was entered into California’s Convicted Offender DNA Data Bank (CAL DNA Data Bank). Two weeks later, Detective Willover was notified by the California Department of Justice that a “cold hit” was made on Deborah L.’s case: John Doe DNA was given a name: Paul Eugene Robinson.³

On September 15, 2000, at approximately 9:45 p.m., Paul Robinson was arrested by the Sacramento Police Department’s Career Criminal Apprehension Team. Within minutes of Robinson’s arrest, Detective Willover called Deborah L. and told her the news.

As Deborah L. would later tell others, that late-night phone call changed her forever. No longer would she wonder if the man standing in line at the grocery store was the man who had raped her. Her attacker now had a face—and the attacker was in custody.

Authority for John Doe Warrants

Penal Code section 804 provides that

prosecution for an offense is commenced when any of the following occurs: ... (d) An arrest warrant or bench warrant is issued, provided the warrant names or describes the defendant with the same degree of particularity required for an indictment, information, or complaint.

1. See Penal Code § 800; the statute of limitations for enumerated sex crimes was extended after this crime to 10 years, or later, if certain conditions were met. See Penal Code §§ 801.1 and 803(g)(1).
2. This DNA profile was developed by Sacramento County District Attorney’s Laboratory of Forensic Services Criminalist Jill Spriggs, who worked nights and weekends to complete the testing in time.
3. The complaint was later amended to charge John Doe’s true name. See Penal Code § 953.

The requirements for naming a defendant in an arrest warrant are set forth in Penal Code section 815, which provides:

A warrant of arrest shall specify the name of the defendant or, if it is unknown to the magistrate, judge, justice, or other issuing authority, the defendant may be designated therein by any name.

Similarly, Penal Code section 959 states:

The accusatory pleading is sufficient if it can be understood therefrom: ... 4. That the defendant is named, or if his name is unknown, that he is described by a fictitious name, with a statement that his true name is to the grand jury, district attorney, or complainant, as the case may be, unknown.

In order to satisfy constitutional standards, a John Doe warrant must describe the person to be seized with reasonable particularity such that it contains sufficient descriptive information to make an arrest.⁴

Defense Challenge to John Doe DNA

After Paul Robinson was arraigned on the sexual assault charges, the defense filed a motion to dismiss for lack of jurisdiction. The defense asserted that the issuance of a John Doe arrest warrant with a genetic profile does not validly commence a prosecution because a DNA profile does not describe the person to be arrested with the particularity required to satisfy the statutory and constitutional standards.

The response to this motion was simple: There is no better method of identification than a person's DNA. After a lengthy evidentiary hearing, the trial court agreed.⁵ As Judge Cantil-Sakauye⁶ stated,

[The] question raised by this case is whether or not the John Doe male black with a specific DNA profile does, in fact, describe a person with ... "reasonable particularity." ... I think reasonable particularity means a different thing in this day and age than it did even as late as 1967.

In 1894 when the *Cabell* case was decided, which reiterated the Fourth Amendment and common law that an arrest

warrant must be described with particularity, it is clear that they didn't have subjects' driver's license and Social Security number. They didn't have that kind of information. They had a name.

Then as case and identification and people's identifiers evolved through the years, we have many numbers that identify us. But we're also learning that, even though defense counsel has raised contentions with the description of John Doe as Paul Robinson by his DNA profile, that given today's numerous crimes of identity theft, we know that numbers like driver's licenses, Social Security numbers, we know that credit card numbers can all be swiped and can be changed and amended to another person, and that those are not true numbers anymore in the society we live in.

Given today's changing addresses of a mobile society, addresses aren't good either. Anyone can tell you when you go to serve a warrant or look in a computer system, there are three addresses.

Additionally, given today's cosmetic surgery choices, I know it can change body shape, face structure, hair, eyes. I don't know what, in fact, is a true identifier. But in my opinion, it certainly appears that, as of today, DNA is unalterable in the year 2001, and it appears to be the best identifier of a person that we have.

With that, the court denied the defendant's motion to dismiss the charges.

The Real Paul Robinson

While the John Doe DNA warrant tolled the statute of limitations and put a face to a DNA profile, it did not truly tell the man behind the numbers.

After Robinson was identified for the 1994 rape of Deborah L., it was discovered that Robinson committed several additional crimes. As a result of additional DNA testing, Robinson was linked to four more home-invasion sexual assaults of women. Numerous other cases were linked by modus operandi or other evidence.

A timeline of Robinson's crimes introduced into evidence at trial⁷ revealed the following:

4. *People v. Montoya* (1967) 255 Cal.App.2d 137, 142-143, fn. omitted, relying on *West v. Cabell* (1894) 153 U.S. 78 [38 L.Ed. 643]; see also Cal. Const., art. I, § 13 ["a warrant may not issue, except on probable cause ... particularly describing the ... persons and things to be seized"]; § 813(a) [magistrate must find "reasonable ground" to believe defendant committed the offense].

5. The evidentiary hearing addressed several issues raised by the defense, including the legality of John Doe warrants and whether extrinsic evidence could be used to make up the deficiencies of an insufficient arrest warrant.

6. Judge Cantil-Sakauye is now a justice on the Third District Court of Appeals.

7. See Evidence Code §§ 1101 and 1108.

October 20, 1993—Alanna S. (Burglary/Rape)
January 11, 1994—Heather M. (Burglary/Attempted Rape)
May 6, 1994—Paula F. (Burglary/Rape)
August 25, 1994—Deborah L. (Burglary/Rape)
December 7, 1994—Terri B. (Burglary/Assault)
November 17, 1998—Jennifer M. (Prowling)
February 18, 2000—Heather O. (Burglary/Rape)⁸

This timeline revealed a clear picture of Paul Robinson: He was a serial prowler. He was a serial burglar. And he was a serial rapist.⁹ If not for DNA, Robinson's crime spree would likely have gone undetected by law enforcement.

If not for DNA, at least five women would continue to wonder if the man in the grocery line was her attacker. Instead, each woman was ultimately given the satisfaction of knowing **who** was responsible for her crime. And in the end, each one was present to see Paul Robinson sent to state prison.¹⁰

The Future of *People v. Robinson* and John Doe DNA Warrants

Paul Robinson is currently appealing his conviction on several grounds, including the legality of John Doe warrants.¹¹ The Third District Court of Appeals upheld the use of John Doe warrants.¹² However, in February 2008, the California Supreme Court granted review. The California Supreme Court has posed the following issues:

- (1) Does the issuance of a "John Doe" complaint and arrest warrant timely commence a criminal action and thereby satisfy the statute of limitations?
- (2) Does an unknown suspect's DNA profile satisfy the "particularity" requirement for an arrest warrant?
- (3) What remedy is there, if any, for the unlawful collection of genetic material under the DNA and

Forensic Identification Data Base and Data Bank Act of 1998 (Penal Code §§ et seq.)¹³

The decision by the California Supreme Court could potentially be issued by late 2009. Because there are no other published California cases dealing with the legality of John Doe DNA warrants, it is anticipated that the court will consider opinions from other jurisdictions.

Review of John Doe DNA Warrants from Other Jurisdictions

Since Wisconsin issued the first DNA warrant in 1999, several states have followed suit. Only a few of these cases have resulted in appellate decisions. All have upheld the use of DNA warrants where the warrant provided a unique genetic profile as a description. These cases are:

- *Wisconsin v. Dabney* (2003) 264 Wis. 2d 843; 663 N.W.2d 366 [review denied October 1, 2003]
- *State v. Davis* (2005) 281 Wis. 2d 118, 698 N.W.2d 823
- *State v. Danley* (2006) 138 Ohio Misc. 2d 1; 853 N.E.2d 1224
- *State v. Belt* (2008) 285 Kan. 949; 179 P.3d 443¹⁴
- *People v. Martinez* (2008) 855 N.Y.S. 2d 522

Future Impact of *People v. Robinson* on John Doe DNA Warrants

While the fate of Paul Robinson's conviction rests with the California Supreme Court, so too does a creative means to apprehend criminals. Thanks to changes in the law since Deborah L.'s assault, there is virtually no statute of limitations in sexual assault cases where the perpetrator is identified in a cold hit case by DNA and the evidence was analyzed within a certain time period.¹⁵

8. In the case involving Heather O., the jury deadlocked 10–2 in favor of guilt. Heather O.'s case was complicated by the presence of a low-level mixture of DNA from several sources.

9. The gaps in Robinson's crimes were separated by state prison commitments from November 1995 – October 1998 and November 1998 – July 1999.

10. Robinson was convicted by jury of one count of forcible oral copulation (Penal Code § 288a(c)(2)), two counts of penetration with a foreign object (Penal Code § 289(a)(1)) and two counts of rape (Penal Code § 261(a)(2)). In addition, the jury found true that the defendant used and was armed with a knife during the commission of these crimes.

11. Robinson also claimed that his blood sample was collected illegally and should have been suppressed. Specifically, at the time Robinson's blood sample was drawn and later entered into the Cal DNA Data Bank, he had not been convicted of a "qualifying offense" under Penal Code section 296. Additionally, Robinson asserted that the DNA evidence should have been excluded, claiming there is no generally accepted statistical calculation in "cold hit" DNA cases. The statistical issue was resolved in *People v. Nelson* (2008) 43 Cal.4th 1242, where the California Supreme Court found that the product rule used in cold-hit cases is both relevant and admissible.

12. *People v. Robinson* (2007) 156 Cal.App.4th 508, review granted Feb. 13, 2008.

13. *People v. Robinson* (2008) 72 Cal.Rptr. 621.

14. While the Kansas Supreme Court upheld the use of DNA warrants where the unique DNA profile of the suspect is used in the warrant, the court also ruled that merely listing the DNA loci used is insufficient.

15. See Penal Code § 803(g).

However, in crimes that do not involve felony sexual assault, or where the sexual assault kit is not analyzed within the statutory timeline, John Doe warrants present a viable means to satisfy the statute of limitations.¹⁶ For instance, in 2004, a man wearing a mask walked into a Bank of America in Santa Clara and robbed the employees at gunpoint. As he fled, he left his mask and DNA behind. Utilizing the robber's DNA profile, a John Doe warrant was issued before the three-year statute of limitations expired. The DNA profile was later matched to convicted felon Froilan Roldan who had recently been released from prison. Roldan was also linked to several other bank robberies. Roldan pled guilty and agreed to an 18-year prison sentence.¹⁷ John Doe warrants promise to play an important role in DNA cases for the foreseeable future.

While William Shakespeare made clear that time is the justice that examines all offenders, sometimes justice takes time. The use of John Doe DNA warrants gives law enforcement and prosecutors that time. In the end, perhaps that time will allow for true justice. For Deborah L. and all of Paul Robinson's other victims, the use of a DNA warrant did just that.

Anne Marie Schubert's 18-year career as a deputy district attorney began in Contra Costa County, and included five years in Solano County before she joined the Sacramento County District Attorney's Office in 1996. Presently assigned to the Major Crimes Unit, her duties are primarily dedicated to murder cases, including the Cold Case Prosecution Program.

DNA Helped Deborah L. Find Justice

I was 24 years old when the life I knew suddenly and violently changed forever. I was raped in my apartment by a man whose face was covered. I didn't know that much about DNA back then—I knew it was used to determine paternity and I knew that if I were ever attacked, I needed to preserve the evidence and not take a shower. But I never thought DNA would affect me as personally as it did. After the attack, I called the police immediately and DNA evidence was collected as part of the rape kit. The DNA was run through the computer database but there was no hit. The detective on the case—Sacramento police detective Pete Willover—was certain I was a victim of the “Second-Story Rapist” but that's where progress ended. Over time, the case grew cold.

It was a year before I felt comfortable going out. I quit my job (I worked in a ground-floor building with an all-glass front and I couldn't handle that) and moved back home with my parents. Every time I was out in public I wondered if my attacker was around. Each year, Detective Willover would call me to give me an update on whether the DNA had produced a hit, meaning my attacker had been identified. From the beginning, I was always aware of the statute of limitations in place. Of course, Detective Willover and the prosecutor, Sacramento County Deputy District Attorney Anne Marie Schubert, were well aware of it, too. Every day in California more DNA profiles with names and faces are added to the database. We had the profile but no time to wait. As the clock was winding down, Ms. Schubert happened to read an article in the *Sacramento Bee* about a case in Wisconsin where law enforcement issued a “John Doe” arrest warrant, which contained a DNA profile and no name to match. They decided to give it a try in my case. This filing tolled the statutes of limitations, and I finally had a glimmer of hope that an arrest would be made.

Only a few weeks after the John Doe arrest warrant was issued, there was a hit on the DNA. It was a match to Paul Eugene Robinson, whose DNA profile was entered into the system as a result of a non-violent juvenile offense. Without the John Doe warrant, the statute of limitations would have run out and Robinson could not have been arrested for my attack.

I then became known as “Deborah L.” and Robinson was tried for my rape and the rape of another women in a joined trial. The trial was hell for me. Immediately the defense made accusations of racism. I knew it was a strategy employed to influence the racially mixed jury, but the accusations still hurt. When the case went to the jury, the jurors were out for a week. I was mentally preparing myself for a hung jury, and even though I knew the case would be tried again, I just wanted this to be over.

Finally a decision was reached. The jury found Robinson guilty for my rape, but not guilty for the other. After polling the jury, we found out there was one hold-out juror unwilling to find Robinson guilty because she felt so many African-Americans have been wrongly convicted. But this same juror voted to convict Robinson of my rape because she couldn't dispute the DNA evidence. DNA is the great equalizer and racial stereotypes play no role. I still feel bad that that other victims did not receive the justice they deserved, but I hope knowing that Robinson is in prison has brought them some sense of peace.

Paul Robinson is now in prison serving his 65-year-sentence and filing appeals. In the meantime, I've moved forward with my life. I work in the public school system, am married, and have a beautiful four-year-old daughter. Has the arrest of my rapist given me closure? I don't think there's ever closure. And closure is not something I ever wanted. All I ever wanted was justice.

The justice I have received is because of forensic DNA.

— As told to Laura Bell and Jennifer Scott

16. In some jurisdictions, the backlog of analysis for sexual assault kits is so large that it is difficult to have them analyzed within the two-year requirement of Penal Code section 803(g).

17. See <http://www.americanchronicle.com//articles/view/109511> (accessed Aug. 12, 2009).

San Diego County Cold Cases: Justice Through DNA

by Jeff Dusek, Deputy District Attorney, San Diego County

One of the first decisions by newly elected San Diego County District Attorney Bonnie Dumanis in 2002 was to establish a Cold Case Homicide Division (CCH), tasked with investigating and prosecuting the almost 2,000 unsolved murder cases in San Diego County.¹

Two prosecutors, five district attorney investigators, one paralegal, and one secretary were assigned to the unit. All had extensive experience with homicide cases.

It was clear from the beginning that solving any of the cases would be a monumental task. However, with the assistance of the San Diego Police Department and the San Diego County Sheriff's Department crime labs, the decision was made to focus on those cases with a potential for DNA evidence.

That decision demonstrates the law enforcement community's recognition of DNA as an important tool for finding killers and securing convictions in cases that may otherwise be impossible to prove. This high regard for DNA evidence has been shown time and time again to be well deserved. For instance, since the San Diego County DA's Cold Case unit was formed, DNA has successfully put eight killers behind bars. Some of those murders had gone unsolved for more than 20 years before a DNA match helped close the case.

As a law enforcement tool, the DA's Cold Case Homicide Division uses DNA in a variety of ways; one example is the use of DNA to identify the true killer among a group of possible suspects. This is how DNA was used in the case of Antonio Ayala.

Antonio Ayala

Antonio and Miguel Ayala were brothers in their 20s who came to the United States illegally from Honduras. On September 16, 1991, two armed men in ski masks forced their way into a house shared by the brothers. The masked men were armed with guns, but the brothers managed to disarm them. The masked men then proceeded to attack the brothers with knives. Both brothers were stabbed numerous times, but somehow in the chaos, Miguel Ayala managed to remove the ski mask from one of his attackers. Miguel survived the attack and was hospitalized; Antonio died from his wounds.

The case was particularly difficult to investigate because the victims, witnesses, and suspects were all illegal immigrants from countries where police were known to be corrupt. As a result, investigators struggled to overcome cultural biases and fear of deportation. Based on the statements the investigators were able to obtain from witnesses, they identified possible suspects but were unable to say for certain which of the suspects were actually involved in the murder. The best hope that they had to solve the case was the mask that Miguel Ayala removed from his attacker.

Thirteen years later, DNA taken from the ski mask was matched to Odilon (Ody) Albarran,² one of the initial suspects whose involvement could not previously be proven. When the witnesses were re-interviewed after the DNA match, they were much more cooperative than they had been at the time of the murder. Albarran was eventually tracked

down in Los Angeles where he was arrested and brought back to San Diego to stand trial. Albarran was convicted and sentenced to life in prison without the option of parole, plus one year.

Laura Arroya

In other cases, a suspect was initially identified, but there was not sufficient evidence to convince a jury of the suspect's guilt beyond a reasonable doubt. This was the situation in the case of Laura Arroya. The nine-year-old girl went missing on June 19, 1991. Laura had been upstairs watching television with her mother in her family's Chula Vista apartment when the doorbell rang. She went down to answer the door and never came back. After a panicked search around the house, Laura's parents called the police. The police searched all night for Laura with no success.

Early the next morning, Laura's body was found on the sidewalk of a business park in Chula Vista. She had been sexually assaulted and stabbed numerous times with a pickax. Although Manuel Bracamontes was seen in Laura's complex around the time she disappeared, early attempts to connect Bracamontes to the murder failed. In 2003, the evidence was re-examined, and DNA from oral swabs, neck swabs, and fingernail trimmings was compared to DNA evidence collected from Bracamontes in 1991. The DNA matched with a probability of 1 in 2.7 trillion that Bracamontes was the source of the DNA found on Laura. Based on this DNA evidence, the district attorney's office was able to secure a conviction in 2005, and Bracamontes was sentenced to death.³

1. As of August 2009, in cold cases involving DNA, the San Diego County District Attorney's Office has earned six convictions. In addition two cases were closed because the suspect had died. Nine cases are awaiting trial. There are 16 cases entered into CODIS, and 19 that are awaiting DNA results and further investigation. Two cases had DNA hits on a suspect already on death row.
2. See *People v. Albarran* (January 13, 2009) 2009 WL 73958 [unpublished].
3. American Judicature Society [Manuel Bracamontes], http://www.ajs.org/jc/death//2005/jc_death_cases4qtr.asp (as of July 22, 2009).

Pamela Shelley

DNA was used in a similar way to secure the conviction of Pamela Shelley's killers. On the morning of March 22, 1995, children taking a shortcut through a Chula Vista park as they walked to school discovered the body of Pamela Shelley. She was nude, lying face down on top of her clothes, and she had been shot numerous times. When police arrived, they found two 40-ounce beer bottles, several unused condoms, two used condoms, and two condom wrappers. Vaginal swabs taken from Pamela Shelley's body and semen from the used condoms were used to create two distinct DNA profiles. Police also recovered fingerprints from the beer bottles.

The fingerprints were submitted to a fingerprint identification system and the DNA profiles were entered into CODIS (Combined DNA Index System) with no matches on either. The fingerprints were run periodically with no success until April 2004 when they were matched to Andre Robinson⁴ and Adrian Southerland. Both men had been in the Navy and were living in Chula Vista at the time of the murder. Although Southerland's fingerprints from the beer bottle put him in the park the night of the murder, he denied ever being in a park or drinking beer with Robinson.

To prove that Robinson and Southerland were not only in the park the night of the murder, but that they were the killers, DNA was obtained from both men and was positively matched to the DNA recovered from the scene. In 2006, Robinson was sentenced to life in prison without the option of parole and Southerland was sentenced to 12 years in prison.

Rickie Blake

In the above mentioned cases, DNA was used to confirm a killer when a suspect had been identified. Another

important application of DNA is the identification of a previously unknown defendant by entering DNA recovered from a crime scene into the CODIS database or checking the DNA against databases of convicted offenders. One such example is the case of Rickie Blake.

Rickie Blake was 14 years old when she went missing in 1986. Her family had gone to sleep while she stayed up to watch the Padres baseball game on television. When her parents got up the next morning, Rickie's shoes were still there, but Rickie was gone. That night, Rickie's body was found beaten, strangled, and sexually assaulted on a freeway off-ramp.

While Rickie's case went unsolved, her killer, George Williams, Jr.,⁵ went to prison for a rape that he committed just a week after Blake's brutal assault and murder. Upon his release, a DNA sample was taken from Williams and put into a database of California offenders. In 2003, DNA evidence recovered from Rickie's body was compared with that database and was matched to Williams. By this time, Williams was serving time in Indiana for another sex crime. The DNA match made it possible for Williams to be extradited to San Diego where, in 2005, he was convicted and sentenced to death for Rickie Blake's murder.

Janet Moore

A case where DNA was used similarly to identify a previously unknown killer was that of Janet Moore. Janet Moore was a 27-year-old prostitute who was found stabbed to death in her downtown San Diego apartment on June 11, 1988. Investigators determined that Janet Moore's killer injured himself during the murder and that some of the blood recovered from the crime scene was his. Years later, the blood recovered from the apartment was used to create a DNA profile that was entered into CODIS, but did not match anyone in the system.

In November of 2004, Barbara Hart, a prostitute living in Valusia, Florida, was sexually assaulted by an unknown male. A post-assault examination yielded a DNA profile that was also entered into CODIS and matched Janet Moore's killer, but did not yield an identity for the source of the DNA.

While DNA was able to link the two crimes, it was old-fashioned police work that solved the case. Based on interviews with Barbara Hart and several other prostitutes from the area who had similar encounters with a violent male, investigators came to believe that the attacker installed carpet for a living and drove either a blue or a white van.

In July 2005, a police officer in Florida pulled over a blue van with an expired license plate driven by Mark Elder.⁶ When Elder consented to a search of the van, the officer observed carpet installing equipment, several pairs of soiled men's underwear, numerous condoms, a video camera, and a partially smoked marijuana cigarette. The officer was suspicious of Elder, so when he cited and released Elder for possession of marijuana, he confiscated the partially smoked cigarette and sent it to San Diego where DNA was extracted. The DNA from the marijuana cigarette matched the DNA from Janet Moore's killer and Barbara Hart's attacker. Elder was arrested, charged, and convicted of murder for the killing of Janet Moore. He is currently serving a 26-years-to-life prison sentence.

William Thompson

DNA was also used to identify a previously unknown killer in the case of William Thompson. William Thompson was the 61-year-old owner and publisher of a community newspaper and the founder and president of a real estate development and property management firm. On January 13, 1987, William Thompson's niece was driving by his house during the day and noticed that the

4. See *People v. Robinson* (Mar. 26, 2008) 2008 WL 786906 [unpublished].

5. American Judicature Society [George Williams Jr.], http://www.ajs.org/jc/death//2005/jc_death_cases1qtr.asp (as of July 22, 2009).

6. Littlefield, Dana. "Fla. Man convicted of killing San Diego woman in 1988." *San Diego Union-Tribune* (June 20, 2006), http://www.signonsandiego.com/uniontrib/20060620/news_1m20elder.html (as of July 22, 2009).

porch light had been left on. When she entered the house to turn off the light, she saw a trail of blood leading out of the bedroom where she discovered her uncle's body. He had been stabbed several times and knives were left stuck in his neck. William Thompson's car was missing and was later recovered partially stripped three miles from his house.

The case remained unsolved until 2003, when the DNA profile from blood collected at the crime scenes was entered into CODIS. DNA from bloodstains in the car and the house matched Stanley Clayton,⁷ a convicted offender who was serving a prison sentence for an unrelated crime. Based on the DNA match, Clayton was convicted of murder and sentenced to a life sentence without the option of parole. DNA was instrumental in this case because Clayton had no known contact with William Thompson before killing him. It would have been virtually impossible for investigators to identify Clayton without DNA.

Lester Larson and Marcus Wilson

The cases of Lester Larson and Marcus Wilson would also have continued to go unsolved if DNA had not linked their isolated murders to a single killer. Lester Larson was a 74-year-old man who lived just south of Balboa Park in the Golden Hill neighborhood home where he grew up. He was an avid golfer who often awoke early to play. On January 16, 1991, Lester Larson's neighbors became concerned and called the police when they noticed a broken window at the back of the house and realized they had not seen him all day. When police arrived, they found blood throughout the lower level of the home, and Lester Larson's body beaten to death with his own golf clubs.

Marcus Wilson was a 63-year-old war veteran who returned from his time

of service with mental health issues that prevented him from caring for himself. He had been living in a residential facility for 30 years. On January 24, 1991, when Marcus Wilson missed breakfast, one of the other residents went to check on him. The resident found Marcus Wilson dead on his bed with blood on the floor and the wall nearby. The window to his bedroom had been broken, and his new television was missing.

In 2005, blood evidence from the Lester Larson crime scene was processed and revealed a DNA profile that matched Abdul Haleen Salaam.⁸ Investigators began looking into unsolved crimes in the area and immediately noticed similarities with Marcus Wilson's murder, which occurred eight days after the Lester Larson's murder and only two-and-a-half miles away. DNA from blood on Wilson's pants and a palm print found at the scene matched Salaam. In 2007, Salaam was convicted of both murders and sentenced to life in prison without the option of parole.

Gail Shea

Unlike the cases of Lester Larson and Marcus Wilson, in the case of Gail Shea, DNA identified her killer, but alone was not enough to secure a conviction. Gail Shea was a 42-year-old homeless woman living in Balboa Park. On August 26, 1998, her partially clothed body was found stabbed and strangled in a canyon area behind the San Diego Air and Space Museum in Balboa Park. There was evidence that she had sexual intercourse before her death, but investigators could not conclusively say whether she was raped. The initial investigation yielded no suspects, but in 2003, DNA recovered from Gail Shea's body was submitted to the California Convicted Offender database and it was ultimately matched to the DNA of Dwayne Johnson.⁹

Investigators, however, still had to gather more evidence before they could bring charges. Johnson's former wife was contacted. She told investigators that Johnson once told her that he had killed people. Investigators arranged for a meeting between Johnson and his ex-wife in a hotel room that was wired with video and audio recording equipment. While officers listened in a nearby hotel room, Johnson told his ex-wife about the events that led up to Gail Shea's death and how he killed her. After the meeting, as Johnson got up to leave the hotel, the officers arrested him. When officers confronted Johnson about Gail Shea's murder, he confessed. In October 2008, Johnson was found incompetent to stand trial and sent to a state hospital where he remains today.

The District Attorney's Cold Case Homicide division is currently in the various stages of bringing at least five other killers to justice with the help of DNA—and the numbers keep growing. With CODIS continually updated and the continual submission of felon DNA to offender databases, crimes will continue to be matched to their perpetrators. There is no doubt that DNA has proven its value and will have a prominent place in criminal prosecution for the foreseeable future.

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7. Green, Kristen and Joe Hughes. "Man arrested in publisher's 1987 killing." *San Diego Union-Tribune* (Feb. 18, 2005), <http://www.signonsandiego.com/news/metro/20050218-9999-7m18busted.html> (as of July 22, 2009).
8. Littlefield, Dana. "Convict gets two life terms for 1991 slayings." *San Diego Union-Tribune* (Feb. 7, 2007), http://www.uniontrib.com/uniontrib/20070202/news_7m2salaam.html (as of July 22, 2009).
9. Littlefield, Dana. "Trial ordered in 1988 park slaying." *San Diego Union-Tribune* (Nov. 30, 2007), http://www.signonsandiego.com/uniontrib/20071130/news_7m30johnson.html (as of July 22, 2009).

Justice and Science: Trials and Triumphs of DNA Evidence

by The Honorable George “Woody” Clarke, San Diego Superior Court

San Diego County Superior Court Judge Clarke served as a deputy district attorney with the San Diego County District Attorney’s office from 1982 to 2003. During that time, through a series of unpredictable circumstances, he became one of the foremost experts on DNA evidence in the ranks of U.S. prosecutors. Ultimately, he would be tapped by Attorney General Janet Reno to serve, as he describes it in his book, on a national commission to “undertake an extensive review of the entire area of DNA testing and the justice system.”

In his book, Justice and Science, Judge Clarke tells the story of forensic DNA: the courtroom battle for its acceptance as evidence, its impact on cases large and small, and his own part in advancing DNA as a tool of criminal investigation and prosecution. Through these excerpts (from chapters 2-4 of the book), IACJ chronicles a piece of the history of forensic DNA through the eyes of a first-hand participant in that history. And along the way, Judge Clarke offers a solid primer on the science itself.

A New Prosecutor

I started out [as a prosecutor in the San Diego County District Attorney’s Office] in 1982 working in the family-support division. It involved civil law, rather than criminal law, but it was a start. I went after fathers who were failing to provide child support. Six months later I was assigned to another division. But I had learned something that would prove crucial to me when I began to practice criminal law. To prove paternity, it wasn’t enough in most cases for the mother to simply testify that the defendant was the father. Occasionally, the physical appearance of the child was enough corroboration when unique hair or skin color, for example, was shared by the child and the defendant. More commonly,

blood testing was used to make comparisons. By the 1970s the courts accepted scientific tests to compare blood types of a mother, a child, and a suspected father. Using ABO blood typing and the analysis of other protein markers in blood, one could statistically show the relationships of a mother, a child, and a defendant. For many years these tests were the best means of proof at our disposal—but they ultimately proved to be a narrow scientific window into a far more powerful way of determining biological relationships.

One trial that showcased the gray areas in this technique involved, ironically, a heated factual dispute as to whether the suspected father-defendant had even had sexual relations with the mother. In a divorce agreement the defendant acknowledged being the father of the child, but a forensic expert testified that the divorce papers had been forged. If they were valid, the defendant would have already conclusively admitted to being the father. But the defense expert claimed that the defendant’s signature wasn’t genuine and that the blood-test results offered into evidence by my experts were just plain wrong. One of my first witnesses was a blood-typing expert from the University of California at Los Angeles. Ultimately, the jury was convinced by that expert and the other evidence in the trial that the defendant was indeed the father. This was the first time that I fully understood that the decisions of jurors would increasingly come from evolving definitive science—as long as it was presented in a way they could understand. But to explain the evidence and to deal with expert witnesses I had to acquire a real understanding of the underlying fundamentals. Because I had avoided physics, chemistry, and biology in high

school and college, I would be forced to learn a great deal about science. And, as it turned out, I had little time in which to make up for those gaps in my knowledge.

[In 1994, Woody Clark was transferred to the El Cajon branch office. In December of that year he was asked to second chair a murder case, working with Dan Williams, the prosecutor who was assigned first chair.]

In the case that I was helping Williams with, the evidence included blood recovered by police. The technology that was available to crime labs at that time was limited to testing ABO blood groups and a few protein types also known to exist in blood. This type of testing was the best science had to offer in the early 1980s. DNA testing would not be allowed in a court of the United States until 1988 in a rape trial in Florida. And it was an interesting case that debuted DNA testing in the United States. A man named Tommie Lee Andrews was charged with the knifepoint rape of a woman inside her home in the Orlando area. Andrews had been convicted of another sexual assault and sentenced to prison, and prosecutors believed he was responsible for a number of attacks on other women. In one, semen evidence left was subjected to DNA testing. The result: the evidence matched DNA taken from Andrews himself. The chances that someone else could have left the semen were estimated at one in billions. Andrews claimed an alibi for the time of the assault, but the jury convicted Andrews based on the DNA evidence. Andrews was then sentenced to a term of over one hundred years in state prison.

As DNA evidence began to be used in courts in the United States, attorneys representing defendants linked to crimes by DNA sometimes fought the use of that evidence in court. Even before that

time, in the early 1980s, attorneys would frequently file written motions asking trial courts to exclude the results of ABO blood grouping and protein testing. Their claim: the technology used by crime labs for typing ABO and proteins had not yet been legally approved in California. No decision of a higher California court, they contended, had found such testing admissible in court. They were right—no legal opinion by a court of appeal or the Supreme Court of California had decided that ABO and protein testing was appropriate for a jury to hear about and consider at that time. When defendants objected, it would have to be proved in court that the technologies were, in fact, reliable before a jury could properly hear the evidence.

In California, in order to present to a jury the results from a new scientific technique, the attorney for the side that wants to use the evidence is required to first prove to the judge that the science meets what is known as the *Kelly-Frye* rule. Based on a federal court of appeal decision that reached all the way back to 1923, the rule required that the party—whether the prosecution or defense—first prove to the trial judge that the technology used was “generally accepted” by the scientific community. Then—and only then—could the results of that testing be heard by a jury deciding the guilt or innocence of a charged defendant.

In the few cases that included challenges to ABO and protein testing (often called serological testing) the prosecutors assigned the cases looked for help. In the murder case I was working on with Williams, he confessed to me that he didn’t understand any of the science that was involved. Would I, he asked, take care of the hearing that was needed in this case? The hearing on whether Williams would be able to use the serological results ended up lasting nearly a full year. Many experts were called and provided lengthy testimony in front of the judge. Ultimately, the judge allowed the evidence to be heard by the jury. But that case, although I didn’t know it at the time, would shape my future in the law.

A few of the experts who had testified in that hearing on bloodstain-testing evidence—even before the Tommie Lee Andrews case—had told me that an evidentiary tool even more powerful and definitive than serology testing would soon become available. Its name was so long I had difficulty pronouncing it: deoxyribonucleic acid. One expert laughed and said to me: “Woody, just remember the letters D-N-A.”

At that point I could have no conception of how powerful DNA evidence would later prove to be. Nor could I have imagined how difficult it would be for DNA to get its day in court. Today anyone who watches television shows like *CSI* must think that the forensic power of DNA evidence has been applied in both criminal and civil cases for a long time. After all, the discovery of its structure had taken place all the way back in the 1950s. Why, then, did it take so long for this technology to become admissible, and what happened along the way? There were many reasons, starting with the complex business of learning to work with DNA in the laboratory, and many early obstacles had to be overcome before DNA acquired the starring role it has today in solving crimes, clearing the innocent, and linking those responsible for offenses. As I would learn from personal experience, when human and other factors come into play no evidence can be taken for granted.

The Transition to DNA Evidence

I followed up on the tip that the blood experts had given me. To begin, I had to understand the basics of a revolution in genetics and molecular biology. By reading scientific journals and reaching out to the blood-test experts I knew, I learned why James Watson, Francis Crick, and Maurice Wilkins had been awarded the Nobel Prize for their discovery of the molecular structure of deoxyribonucleic acid, or DNA, which came to be referred to by many as the “genetic blueprint of life.” (Only in the years that followed would the crucial work of another scientist, Rosalind

Franklin, be acknowledged.) Two papers Watson and Crick published in 1953 in the British journal *Nature* presented their findings about the double-helix structure of the material on which all life is based, the instruction manual for every living cell.

As I read and learned about the initial evidentiary uses of DNA, I became increasingly excited. I knew this revolution in biology would have a profound effect on the entire legal system, from criminal trials to paternity suits. I also knew that the same hurdle that I faced in the earlier serology-testing cases, the *Kelly-Frye* rule, would be the first of many we would encounter getting DNA evidence accepted by the courts. Why? Because DNA would be even more complicated to explain than serological testing. Yet my sketchy science background, paradoxically, would serve me well. I had to absorb all this knowledge by explaining it to myself, in terms that would not only help me understand but help me explain it to others. Arguing in court previously against highly skilled defense lawyers bolstered my confidence that I could explore this complex science and learn how to use its stunning evidentiary power in trials.

Since the mid-1930s, the FBI Crime Laboratory has stood as the hallmark of forensic testing in the United States. The term *forensic testing* is worth defining: generally, it can be described as the application of science to legal matters, especially the investigation of crime. An expert I called to the witness stand in one hearing on blood evidence was a scientist with the FBI, Dr. Bruce Budowle. Budowle’s experience, research, and publications in the field of bloodstain testing were significant and would later prove pivotal as the Bureau developed techniques in the late 1980s to test DNA. The work of the FBI and other laboratories resulted in a fundamental change in the way biological material could be analyzed.

In 1988, I was invited by the director of the FBI, William Sessions, to be one

of several speakers at an international symposium planned for the fall at the Bureau's academy in Virginia. The seminar was designed to bring together scientists from around the world to discuss this new, cutting-edge technology. I telephoned Budowle in Virginia. The first question I asked him was why me. Bruce deadpanned, "Who else?" His point was, I suppose, well taken. I was one of a tiny group of prosecutors who had been riding the scientific and legal roller coaster of getting serological test results used in court.

I saw his point. If this new DNA technology was going to be used to test samples in criminal investigations, it was going to have to be used in court and at trials. That meant hearings on admissibility. Given the predictions about the extraordinary power of DNA testing, results from serological methods were going to pale in comparison. As the meeting date drew near, I put together a presentation based on my experiences with previous cases. I was convinced that the many lessons I had learned from using ABO and protein testing in court were likely to apply to the introduction and acceptance of DNA evidence. My goal: to tell scientists from around the United States and the world about the interface of science and the courtroom and to give them some tips about what could be expected to happen with DNA in the courts. Best of all, preparing the presentation would push my own learning curve about DNA.

The lectures by scientists from the FBI, Scotland Yard in London, and other laboratories around the world were fascinating. Analyzing DNA was made possible by a tool called *restriction-fragment-length-polymorphism* testing. Referred to as RFLP, this tool could be used to detect the differences in individuals' DNA. It was the result of the work of two scientists from the United States and Great Britain—Dr. Ray White from the Howard Hughes Medical Institute in Salt Lake City, Utah, and Dr. Alec Jeffreys from the University of Leicester. White spoke at the meeting

about discoveries that had been made in his lab a few years earlier.

Jeffreys had already used the RFLP technology in a criminal case in Great Britain in which he compared evidence collected from the bodies of two teenaged girls found murdered in 1983 and 1986. Police in Leicestershire had a suspect in the two killings. They knew about Jeffreys's work with DNA because he had previously assisted British authorities in an immigration case. Investigators asked Jeffreys if he could use his technique to compare DNA evidence believed to have been left behind by their assailant on the bodies of the two raped and murdered girls to a DNA sample obtained from the suspect, a local man named Richard Buckland. Jeffreys agreed. His results staggered the investigators. Although the testing revealed that the same man raped both girls, the RFLP analysis showed that Buckland was not that man. The first use of DNA testing in a criminal investigation showed the suspect was innocent—an early example of how DNA could be used to definitively establish innocence.

Left with no viable suspects, the police turned to the community and asked men to voluntarily give samples of their blood to compare to the evidence collected from the two victims. Each sample was tested, although the majority of men who volunteered to give a sample could be excluded by existing serological techniques like those used in our San Diego cases in the early 1980s. Some samples, however, had to be analyzed using the RFLP process. But not one of the men from whom those samples were collected could have left the DNA evidence recovered from the two girls. Finally, the police got a lucky break. A man was overheard bragging in a local pub that a baker named Colin Pitchfork had paid him to give blood and tell the police that he was Pitchfork. Investigators immediately sought out Pitchfork to see whether he could be the killer. After obtaining a sample of Pitchfork's blood, Jeffreys made the comparison. The RFLP test was conclusive: Pitchfork's DNA

profile exactly matched the samples taken from the girls. Pitchfork was arrested, convicted of the murders, and sentenced to prison for life.

Other speakers at the FBI meeting talked about how evidence samples need to be collected and preserved for later testing. A few spoke to the group about how statistics are used to describe the degree of significance of DNA matches. I felt a little more comfortable with math than with biology. I was familiar with statistics from my previous hearings, but terms like "Hardy-Weinberg Equilibrium" and "Bayes's Theorem" were enough to send me more than once to the water fountain outside the auditorium. More intriguing was an even greater cutting-edge DNA technology that was described at the symposium. As if RFLP typing wouldn't be enough of a challenge to understand in the years to come, I had to learn a new term: the *polymerase chain reaction*. Known by its acronym, PCR, the technique allows an analyst to genetically duplicate very small amounts of DNA over and over until millions, or even billions, of copies are created. (This information wasn't exactly a staple of the curriculum when I went to law school.)

Although the RFLP test we had heard about at the symposium earlier in the week was powerful in telling people apart, it had shortcomings. Among those was the fact that it required a bloodstain about the size of a quarter to get a reliable result. Unfortunately, police frequently don't have an abundance of physical evidence in criminal cases. Small bloodstains and other body fluids are just as, if not more, common in investigations as large ones. PCR would find a place in DNA testing once it was fully developed in the laboratory. Later that afternoon [Budowle and I] drove back to Quantico. The next day was my turn to give a presentation to the group. Science was going to take a back seat to the law. At least that's what I thought.

Before I had flown east for the meeting, I carefully prepared slides to use as visual aids during my lecture. Unfortunately, when projected onto

the auditorium screen they were dark and unreadable. Despite the fiasco, the audience of scientists was enthusiastic. (I'm convinced that each of them must have had a bad experience or two with slides.) The group seemed to be fascinated with the cases I had worked on and how U.S. law determined whether different types of scientific evidence could be used in trials. I hoped that I had made it clear to the listeners that DNA testing in future trials would be vigorously challenged in courts around the world. The questions they asked me after the presentation made it clear to me that they felt the same way.

I came home from the meeting excited about the new challenge that lay ahead. Instead of telling jurors that bloodstains, hairs, and other evidence might possibly have come from someone, DNA was going to significantly enhance the probability that evidence derived from scientific tests would persuade jurors. Although everyone at the meeting was careful to point out that RFLP testing couldn't identify someone in the way a fingerprint does, I knew better. Sure, the results would be that a suspect could not be excluded as the donor of a piece of evidence. But by comparing the types found in both the evidence and a sample of the suspect's own blood, and then consulting databases that contain genetic types of large numbers of people from around the world, statistics can take over. If a match is made, the chances that someone other than that person left the evidence are typically one in millions, billions, or even trillions. This technology was going to revolutionize how cases were solved and proved. Little did I know how it would change my own life and career. I would get some on-the-job training in science and technology that would propel me into playing a role in revolutionary changes in criminal law and procedure.

After my experience with cases that involved serology testing, it was time for me to move on. I was moved to the felony-trial division of the district attorney's office to work closely with the other prosecutors in the office, and I

began to try my own felony cases.

One of the laboratories that early on provided DNA RFLP testing, Cellmark Diagnostics, was located in Germantown, Maryland. Its parent laboratory was in Abingdon, Great Britain; it offered RFLP testing in the United Kingdom as a result of an agreement with Jeffreys. Cellmark was asked to perform RFLP testing by the San Diego Police Department in the handful of investigations in 1989 and 1990 that were believed appropriate. Those cases were largely rape cases in which the identity of the attacker was questioned. Prior to that time, law enforcement, prosecutors, and juries had to rely on serological testing, with its obvious limitations. But DNA promised much more. At first the science seemed terribly complex to me, but I soon found that it was possible to break this complicated subject down into basic, manageable units I could comprehend. And I knew that many other lawyers would soon be able to understand how this powerful evidentiary tool could be used in court.

DNA, as mentioned previously, is frequently referred to as the genetic "blueprint" of life and is the material located in chromosomes found within the nuclei of most cells. It consists of long, tightly coiled strands containing approximately 3.3 billion pieces of information called *base pairs*. The bases that make up the pairs are one of four variations, individually named adenine, cytosine, guanine, and thymine (abbreviated A, C, G, and T). The sequence of DNA, or order of the base pairs, is the same in every cell except for those that govern reproduction—female eggs and male sperm. Each reproductive cell contains only one-half of a person's DNA. That fact permits the creation of a full complement of DNA as a result of the fertilization process and the creation of an embryo and then a fetus.

Approximately 99.9 percent of the order of these 3.3 billion bases is identical for all humans and essentially serves as the instruction manual for the body's growth, structure, and functions. As a

result, each person has two eyes and hair of a particular color, a stomach that produces the acid needed for digestion, and every other fragment of blood, bone, and tissue that makes up the human body. All living things on earth—humans, animals, and plants—have DNA.

However, about one-tenth of 1 percent of the sequence of the base pairs of human DNA can vary from person to person. Although the percentage difference is small, that means roughly three million of these A, C, G, and T bases are combined in different sequences in different people. The one exception is identical twins, who share the exact same DNA sequences. The fact that humans vary at these DNA locations allows scientists to distinguish among people. By testing samples at those particular locations—or loci—scientists can determine whether a particular person could, or could not, be the donor of a specific piece of biological evidence.

Cells that have a nucleus, and therefore DNA, are found throughout the body. Blood, bloodstains, sperm, hair roots, bone, teeth, organs, and other tissue all contain DNA that can be tested by scientists. Body fluids in liquid or dried form, such as saliva and vaginal secretions, can also be tested. These fluids usually contain DNA in what are referred to as epithelial cells, which come from the lining of the mouth, vaginal vault, or other mucous membranes of the body. In criminal cases the types of evidence from which DNA can be removed and tested are many and varied. Examples include blood and semen stains on clothing, weapons, bedding, and other surfaces; swabs taken from victims of sexual assault; hairs with attached root follicles; even envelope flaps and postage stamps that have been moistened with saliva. The RFLP testing method described by White and Jeffreys wasn't restricted to criminal cases. In fact it began to be routinely used in medical diagnostics, genetics, molecular biology, and other scientific fields unrelated to investigations of crimes.

[The RFLP] technique requires the division of DNA into fragments of

various sizes. Because some of these fragments of DNA are relatively large and consist of thousands of base pairs, the DNA must be in good condition and appropriately preserved. Because DNA is a biological substance, it is perishable and degrades with time. The result of degradation is a gradual breaking up of the DNA fragments. At a certain point in the degradation process it becomes impossible for DNA results to be obtained.

The RFLP technique itself involves several steps. After the removal of DNA from an item of evidence, an evaluation is made to determine how much DNA is present and its quality. If enough good-quality DNA is present, the analysis can proceed. The second step is referred to as *restriction*. Enzymes—proteins that act as catalysts, or enablers, for biochemical processes on which life depends—are used to divide DNA into discrete portions where DNA varies from person to person. This step, which uses “molecular scissors,” allows scientists to look at smaller, variable sections of our DNA instead of the unmanageable three billion-plus pieces of information. These particular sections of our DNA contain variations in which small sequences of the same As, Cs, Gs, and Ts are repeated a different number of times. For example, the sequence at a particular genetic location may be CATAGGCA. One person may repeat that sequence 1,250 times; another person may repeat the sequence 4,755 times; a third may repeat it 2,670 times.

The third step is referred to by the rather intimidating term *electrophoresis*. The process, however, is simple. When the restricted—or cut—DNA sample is placed in a gelatin-like substance and electricity is applied, the samples move from one end of the gelatin toward the other. The larger the DNA sample—in other words, the greater the number of repeats of the target DNA sequence—the harder time the sample has moving across the gel because the gel is constructed in a honeycomb formation that acts as a sieve. Because this process

is like trying to move granular material of differing sizes through a filter screen, the smaller the piece of DNA, the farther it can travel. Thus, smaller DNA fragments that have fewer repeats of the sequence travel farther than the larger fragments.

In the fourth step, a technique known as *Southern blotting* is employed to transfer the DNA from the gel to a membrane. Because the fragments of DNA have had a radioactive “label” attached to them, an analyst can then expose the membrane to X-ray film. The resulting exposure reveals a pattern, or band, at the location on the film where the segment of DNA came to rest during the electrophoresis process. The end result: an X-ray film, known as an *autoradiograph*, which shows where the person’s DNA fragment has traveled to on the gel. Because each person receives one length of repeated DNA from each parent, most people have two fragment lengths, or bands, on each film.

In the fifth step, an analyst takes the samples of evidence and known samples from defendants, victims, or other persons and compares the locations of bands to determine whether those persons can be excluded or included as possible donors of the evidence. Not unlike the bar codes, or Universal Product Codes, found on almost all products purchased in stores and read by devices at cashier stands, DNA banding patterns from samples either match or do not match. If the patterns from an evidence item do not match those derived from a sample taken from a known person, that person is excluded as a possible source of that evidence. If the patterns are consistent or matching, the person is included and may have been the donor of that sample. The final step, taken with matching results, is to estimate how rare or common the DNA characteristics are. By referring to databases of DNA results from human populations worldwide, scientists are able to calculate random match probabilities for matching DNA samples. Those probabilities are estimates of how often the DNA profile shared by the

evidence and the person would be found in different major population groups throughout the world.

Because of the power of the RFLP technique, statistical estimates of the rarity of matching DNA profiles are frequently extremely persuasive. Many cases, including those in the late 1980s, revealed rarity estimates such as one in billions or even trillions. Although DNA analysts were careful not to equate matching DNA profiles to identifications testified to by fingerprint experts, the result in the view of jurors and the legal system was frequently the same. Testimony that the chances are one in 500 million, for example, that someone other than the defendant has left a sample of evidence is extraordinarily powerful. But what about the reliability and accuracy of this new tool? No one thought attorneys representing defendants charged with serious crimes would blindly accept the results of DNA testing in court. But no one anticipated how truly ferocious the response would be.

The Fight for Acceptance

The first cases in San Diego in which DNA evidence was offered proved to be difficult tests of the legal system. Many other forms of scientifically obtained evidence, ranging from fingerprints to drug-test results, had become accepted in courts not only in the United States but also around the world. Each new scientific technique had to overcome initial resistance until established over time. But certain techniques have faced protracted legal barriers. These include polygraph examinations—or lie-detector tests—hypnosis, and the analysis of voiceprints to try to identify voices. The use of each of these tests has met repeated opposition in the courts. Laws in many states prohibit the use of polygraph-exam results and statements made by witnesses while under hypnosis.

The admissibility of scientific testing technologies that are capable of providing powerful information in the investigation of crimes depends on evidence laws and the decisions of appellate and

supreme courts of the fifty states and of the federal system. The *Kelly-Frye* rule was the determining legal standard in the hearings on serological evidence in California.

The simple rule set out in the 1923 opinion of the U.S. Court of Appeals in *Frye v. United States* [was at the time] the dominant standard in both federal and state courts. Most supreme courts across the United States adopted the reasoning of the *Frye* court, and it became the generally established criterion for the admissibility of new types of scientific evidence. The California Supreme Court adopted the *Frye* rule for trials in California in a ruling in a 1976 case, *People v. Kelly*, and the standard came to be known in California courts as the *Kelly-Frye* rule.

In the case of DNA, the effect of allowing such biological evidence in courts would be dramatic. After all, this new technology clearly was going to revolutionize the identification of some of the most violent offenders in communities around the world. Unlike fingerprints, biological evidence is far more frequently found at crime scenes and can be routinely used in the investigation of the most serious crimes. But attorneys representing criminal defendants fought tooth and nail over whether juries should be able to hear DNA testing results. The reason was clear. Because the evidence was more powerful and conclusive than any they had been forced to confront before, the defense of their clients frequently depended on it. Different standards for the admissibility of scientific evidence were used in some of the other forty-nine states, although the *Frye* rule was the most common in the late 1980s. But the import was the same. Lawyers representing defendants accused of serious crimes feared that if a jury heard that a critical piece of DNA evidence came from the accused or could otherwise be connected to that defendant, the defense faced an uphill battle.

And for good reason. Science frequently carries great weight with

jurors. DNA seemed invincible to many because, unlike other tests used by detectives or crime labs, such as voiceprints and lie detectors, DNA testing appeared to be an objective and detached science. If anyone disagreed with the results, a retest could usually be done. So the common way to attack DNA results early on was to try to keep juries from even hearing the evidence.

The *Frye* rule was invoked in most cases when DNA played an important role. That meant judges, in case after case and before a trial could even begin, were required to hear testimony from expert witnesses about whether DNA testing was reliable. During those evidentiary proceedings, experts frequently described the underlying science of RFLP testing, the techniques used to type samples, and how estimates were made of the statistical rarity of matching profiles. The testimony that was required for a judge to decide whether a jury should hear DNA testing results was frequently lengthy, tedious, and sometimes confusing. But judges usually ruled that the jury could hear the DNA test results because those judges were satisfied by expert testimony at the hearings that set out in detail the basic biology of DNA, the RFLP technique, and how the statistical estimates were made. But defense lawyers continued to fight against admissibility and contended that the technology had not been sufficiently evaluated by the scientific community at large. Possible problems, they often complained, included contamination of the samples, the inability to obtain complete results, and the “exaggerated” probabilities of “one in billions” and even rarer estimates.

The whole experience was reminiscent of the previous battles over ABO and proteins. That litigation, however, would prove extremely valuable to me in what would later come to be referred to by many as the DNA wars. Several of the same experts who testified in the serology evidentiary hearings applied their scientific backgrounds and experience to forensic DNA testing. Both supporters and detractors of the

new RFLP technology began to appear in courtrooms across the United States and Europe. The stakes were high: unlike prior bloodstain technology, which simply pointed in the direction of a suspect, DNA test results focused with much greater precision on defendants who were often accused of the most serious crimes, particularly murders and sexual assaults.

The San Diego experience was similar to that in other large counties in California and the rest of the country. Even after bitterly contested hearings, nearly every trial judge in the United States who was asked to rule on the admissibility of RFLP testing permitted its use at trial. Judges heard from expert witnesses that the RFLP technique was used daily in a variety of scientific settings. When questioning experts at these hearings, I always highlighted some of those uses. My personal favorites were, I believed, familiar to people in San Diego. The first was the use of RFLP technology to diagnose genetic illnesses and disorders. In numerous hospitals and clinical laboratories in our own county patients were routinely tested for muscular dystrophy, cystic fibrosis, Tay-Sachs, and scores of similar diseases.

The second nonforensic use I focused experts on was in a field even better known than the medical one in our county—saving endangered animals. In a laboratory at the world-famous San Diego Zoo, the Center for Reproduction of Endangered Species, samples from protected animals worldwide were regularly tested using the RFLP technique. The purpose: to track migration and breeding patterns and then develop programs to prevent further endangerment and even extinction.

I also invariably asked my expert witnesses about a third nonforensic use of RFLP technology—the identification of the remains of U.S. soldiers killed in battle. Unlike any other country in the world, the United States attempts to identify the remains of every soldier killed in combat. San Diego is home to a large active and retired military community. Testimony from experts detailing the use

of the RFLP technology to identify those remains—typically when fingerprint and dental exams were impossible—seemed particularly helpful.

The experts who testified in opposition to RFLP testing generally acknowledged the other, nonforensic uses of the technique. They contended, however, that clean, freshly drawn samples from patients in hospitals and doctors' offices were those used in the testing. Samples taken at crime scenes, they contended, were different. Exposure to sunlight, rain, dirt, and other real-world contaminants made testing unreliable. On cross-examination I would usually ask those experts about the remains of U.S. military personnel recovered from degrading, humid environments like that in Vietnam, or samples of animal hairs of endangered gorillas left behind in their nests in the forests of Africa. Experts would sometimes concede that those samples had to be used and scientists were still successful in obtaining accurate results.

Opponents also frequently pointed to the absence of national standards governing DNA. It is true that there were no national governing bodies regulating and applying uniform standards to forensic DNA testing. Unlike human blood banks, diagnostic laboratories, and other medical organizations, crime laboratories were not usually required to follow any national regulations in performing testing, although the FBI was in the process of developing suggested guidelines for use in crime labs. Courts, however, usually found that problem did not require keeping the evidence from a jury's consideration. DNA was like other techniques used in crime laboratories, they often concluded. Judges would note that crime laboratories, whether fingerprinting, testing drugs, or comparing hairs and fibers, were not normally subject to any standards. The work of crime labs throughout the country, some courts pointed out, was routinely accepted in court, even though doubts were cast on the validity of test results provided by analysts in

those labs who did not have to perform their work according to any mandatory standards. Admissibility was also found even though crime laboratories were not usually accredited or certified by national agencies. Courts often noted the existence of rigorous standards for testing that were implemented by the individual laboratories themselves.

Questions raised about probability estimates did cause some judges concern. Opponents noted the increasingly small probabilities presented to describe the rarity of matching DNA profiles and often expressed fear that the absurdity of numbers like one in trillions, based on population databases that might consist of only a couple of hundred people, might well persuade juries to render a guilty verdict immediately and not weigh the rest of the evidence in a case. Most judges were used to presiding over trials in which ABO or enzymes had been tested and the results reported in court. DNA was clearly different. Instead of a bloodstain from a crime scene matching the blood type of the defendant and one in ten people having the same type, now estimates of the rarity of matching samples were in the billions and even trillions; the probability that a sample came from someone else was usually remote. However, the argument about the disproportionate weight a jury might give to DNA evidence usually didn't prevail. Neither did complaints by some of the detractors that there was a possibility that even the way labs calculated those statistics was flawed. Courts were satisfied that the methods used to calculate the statistical estimates were appropriate because they were used in a variety of settings and were even similar to those already used in ABO and protein testing. Juries, they concluded, had a right to hear this scientific testimony and were capable of evaluating the significance of the evidence in individual cases. Cross-examination, the presentation of their own evidence, and closing argument provided sufficient protection for defendants. So prosecutors, who felt that obstacles to DNA testing's

admissibility had been removed, more freely used the technology than they had in the past. Few, however, foresaw the course that would be traveled in the way courts viewed DNA evidence.

The evidentiary successes of DNA testing were immediate. Proving stranger rapes became much easier than it had been in the past. Instead of relying on often unconvincing—or even mistaken—eyewitness identification, courts and juries now had access to the results of an apparently objective science. The impact of DNA on cases of sexual assault wasn't surprising. Unlike many other violent crimes, sex crimes commonly involve exchanges of biological evidence. And that transfer is not limited to traditional rapes. Perpetrators of sexual assault can leave evidence in the form of semen, saliva, and even hairs, all of which can be sources for DNA testing. Even clever offenders could be identified by biological evidence. A used condom thrown in a garbage can outside an apartment building, for example, can be the source of scientific evidence. Testing of the material inside the condom can pinpoint the rapist; DNA on the outside will likely match that of the victim. A scientific connection can then be made. A cigarette left in a victim's house, a half-eaten apple, a glass used to drink water, even discarded chewing gum, can all be used to associate a suspect with a crime. Each might contain the unique DNA code of its donor.

But the battle over the admissibility of RFLP evidence took an unexpected turn in the fall of 1992. The National Academy of Sciences, a prestigious scientific organization based in Washington, D.C., decided to take a look at forensic DNA testing in the United States. Through its research arm, the National Research Council, the academy put together a committee of scientists and members of the legal profession to closely examine the field and report on its findings. Over a two-year period, the committee reviewed publications and heard descriptions of the state of forensic DNA testing in the country. After that

scrutiny, the committee issued a report in October 1992 entitled *DNA Technology in Forensic Science*.

The publication sent shock waves through courts in a significant number of states. The report fully endorsed the scientific reliability and accuracy of RFLP testing. However, the committee felt that the methods used by laboratories to calculate the statistical estimates of how rare matching DNA types are might be flawed and might overstate the rarity of matching DNA profiles. If true, defendants would be unfairly prejudiced in front of a jury. If the match was one in a million, for example, many individuals even in the United States might have the same profile. If one in trillions, it was unlikely anyone else in the world would match the sample. To be cautious, the group devised an artificial, ad hoc mathematical formula to act as a substitute for the methods used by laboratories. The committee recommended that laboratories use the formula until sufficient scientific research was performed to uphold the methods already in use in crime laboratories. The response from the forensic community was immediate. The techniques used to calculate the rarity of matching DNA profiles were already conservative, they claimed. The recommended artificial formula, dubbed the *ceiling principle*, was overly conservative, inaccurate, and unscientific, DNA proponents complained.

The reaction of courts, however, was mixed. In Massachusetts, New Hampshire, Arizona, Washington, California, and Connecticut, appellate courts decided that it was not proper to let juries hear RFLP testing results as determined by labs that had used the earlier statistical techniques. Citing perceived scientific controversy about the accuracy of those statistical estimates, most of those courts recommended that labs follow the formula suggested in the National Research Council's report. Courts in other states disagreed, deciding that the report's findings were simply recommendations. If a laboratory

provided statistics calculated using the earlier mathematical methods, questions on cross-examination by a defendant's attorney about the National Research Council report would be permitted. However, a jury would still be allowed to hear the evidence.

The result seriously affected prosecutions in those states that decided the report's recommendations accurately reflected existing scientific opinion. Some cases were overturned on appeal on the grounds that the statistical approaches used in preparing and presenting the evidence were not those approved by the committee. More important, trial courts in those states—and courts in other states that were concerned about the report's conclusions—often required use of the ceiling principle. Usually, the result was a dilution of the statistical significance of matching DNA profiles in those cases. For example, if a calculated estimate of the rarity of a match in a case was one in twenty million people, use of the ceiling method might change that to one in 500,000 or an even greater likelihood. The resulting statistic was still meaningful; the power was simply reduced. A skilled attorney sometimes exploited that increase in probability. One common approach in DNA cases is to ask an expert how many people in a given area could be expected to have the same DNA types shared by the evidence and the defendant. If the statistic is one in twenty million, only two people in the State of California, for example, would on average match the profile. If the probability is one in 500,000, five or six would match in San Diego County alone, and the argument that someone else could have left the evidence carries more weight.

Several events over the next handful of years changed the landscape and the way courts decided the admissibility of DNA evidence. A number of studies were completed of population groups around the world to determine whether the possible problems raised in the report were real or imaginary. The results of that research reassured courts and crime

laboratories. The possible sharing of DNA types cited as a concern in the National Academy's report appeared to be unjustified. Also, the extent and potential validity of both scientific and legal criticism of its 1992 report were recognized by the Academy.

As a result, a new committee was put together by the National Research Council to specifically examine the subject of population groups and the way estimates of matching DNA profiles were provided. This time, the committee was staffed with population geneticists and statisticians—in other words, scientists with extensive knowledge of the controversial issues that were raised in the first report. In the new committee's final report, issued in 1996, *The Evaluation of Forensic DNA Evidence*, the concern about isolated populations was minimized. The studies undertaken after the 1992 report showed that the steps labs had normally taken to ensure that their probability estimates were conservative—that is, did not overstate how rare matching DNA was—were appropriate ones. In reality, many experts noted, the statistics ultimately reported probably understated the actual rarity of matching profiles. Thus the ceiling approach was no longer necessary, the 1996 report concluded. In fact, the report was critical of the previous report's nonscientific recommendation that analysts follow its ad hoc recommendation. The new committee noted that the recommendation had been made without any hard scientific or statistical support. The new report did include additional recommendations for cases in which the donor of the evidence might be someone who was a member of a relatively small ethnic or isolated population group.

Confidence in DNA in courts across the country was again high. Courts were reassured to the extent that statistics appear to have never again been rejected by an appellate or supreme court after that time. The way was paved for daily evidentiary use of this powerful scientific tool. But what was it like in the trenches?

The expertise I developed in litigating DNA evidence was called on in over a hundred cases in San Diego courts. As with anything else in life, if you've done something unusual at least once, you're the expert.

The hearings were sometimes extensive but usually involved the same issues. Defendants accused of serious crimes often demanded pretrial hearings in which they would ask a judge to decide whether DNA testing results should be allowed at the eventual trial. Our legal system depends on precedent—law as interpreted by higher courts—and trial judges are required to follow precedent. Because case law from the California Supreme Court and courts of appeal was sparse and sometimes conflicting on DNA, trial judges were required to hold these hearings.

In many cases the hearings consisted simply of providing transcripts of the testimony of expert witnesses in other cases and then arguing to the court about whether the evidence should be allowed. Other cases required calling witnesses to the stand and often lengthy questioning by the attorneys on both sides. Even judges would join in the questioning to find answers to questions they had about the science of DNA and the techniques used in testing. The more serious the charges, the more resources attorneys on both sides devoted to presenting their cases. Hearings sometimes lasted days, even weeks. Experts I questioned in court would testify to the scientific validity of RFLP testing, its nonforensic uses, steps taken in the lab to help ensure quality work, and the scientific acceptance of the statistics that were calculated. By this time, virtually everyone, including defense lawyers and their expert witnesses, conceded the scientific reliability of DNA testing. Their complaints, therefore, usually involved the way results were interpreted, the possibility of laboratory errors, and the numbers. Other experts might thus address the appropriateness of the lab's testing protocol, the training of analysts who performed the testing, and whether the results were interpreted correctly.

The defense frequently called its own expert witnesses. They included college professors, researchers, medical doctors, private DNA analysts, and scientists familiar with population genetics and statistics. Cross-examining those experts proved challenging and time consuming but appeared to be helpful to judges deciding on admissibility. The defense witnesses who were most critical of DNA testing results were sometimes the easiest to cross-examine. In the case of a few of these experts, the bulk of their income came from testifying for defendants in criminal cases. Often the expert's scientific qualifications were in areas only remotely related to human DNA testing. Others simply didn't understand some of the circumstances unique to forensic DNA testing. A medical-diagnosis expert, for example, might be unfamiliar with the techniques used to remove—or extract—DNA from a human hair root or a semen stain on clothing. Once confronted with the laboratory protocol or scientific publications validating a procedure, the expert frequently conceded the reliability of the method.

Judges were, obviously, an important part of the process. Few, if any, were schooled in molecular biology, genetics, or any of the fields touched by DNA testing. Yet, those same judges were called on to decide whether the testing methods and their results could be heard by juries who would be selected to decide the guilt or innocence of defendants in criminal trials. Legally, California judges are required to decide only whether the technology is generally accepted in the scientific community. Yet understanding and deciding many of the issues in these pretrial hearings demanded at least a working knowledge of the theory and procedures.

Cases that led to pronounced battles over DNA included some of the most serious attacks on victims in the San Diego community in the early 1990s. In one, a man was charged with the murders of several women. RFLP evidence linked the defendant to sexual contact with one of the victims. Deputy District

Attorney Dan Lamborn, then a young but extremely talented prosecutor, faced a hearing that would pit many of the same scientists I had usually gathered for my own hearings against defense expert witnesses who disagreed with the scientific acceptance of RFLP testing. Lamborn, with guidance I provided him, ultimately convinced the trial judge that the DNA evidence could be presented in front of the jury.

In another homicide case, DNA testing was used to compare a semen stain recovered from a victim's clothing to a sample obtained from the suspect. The samples matched. I put witnesses on the stand in a hearing on the admissibility of that RFLP evidence for Deputy District Attorney Jeff Dusek, the office's premier homicide prosecutor. The hearing focused on whether the jury should be allowed to hear the statistics that described the DNA match to the victim. The trial judge pointedly asked Dusek and me whether the prosecution wanted to use the population numbers that had been determined by the laboratory rather than the numbers recommended by the National Research Council just months earlier in its first report. I told the judge that we were ready to go forward with the full numbers, unaffected by the report's recommendation to use the ceiling method. After listening to the evidence in our pretrial hearing, the judge agreed that the statistics calculated by our laboratory should be heard by the jury that would decide the defendant's fate.

In the end, San Diego judges admitted DNA evidence in every contested case. The underlying theory and technology of RFLP testing were scientifically established and generally accepted, each of those courts concluded. The procedures in place in laboratories were found to be appropriate. Any dispute about the accuracy of the probability estimates that were provided for matching DNA profiles would ultimately be resolved by juries, our courts decided. The only remaining question: How would that DNA evidence be evaluated by jurors?

“Justice in the life and conduct of the state is possible only as first it resides in the hearts and souls of the citizens.”

—Plato

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Melendez-Diaz v. Massachusetts

by W. Scott Thorpe, Chief Executive Officer, California District Attorneys Association

In the U.S. Supreme Court case of *Melendez-Diaz v. Massachusetts*,¹ the defendant was charged with distribution of cocaine. The prosecution presented three “certificates of analysis” that stated the results of the forensic analysis performed on the cocaine. The persons who conducted the analysis did not testify. Here the Court determined that the admission of the analysts’ certificates violated the defendant’s Sixth Amendment right to confrontation.

In the majority opinion by Justice Scalia, joined by Justices Stevens, Souter, Thomas, and Ginsburg (Justice Thomas also filed a concurring opinion), the court noted that under *Crawford v. Washington*,² a witness’s testimony against a defendant is inadmissible unless the witness appears at trial or, if the witness is unavailable, the defendant had a prior opportunity for cross examination

The certificates prepared by the forensic analysts, who were “accusatory” witnesses, were prepared for the purpose of establishing the substance’s composition, quality, and net weight. Therefore, the analysts’ certificates were testimonial statements, and the analysts were witnesses for the purposes of the Sixth Amendment. Since the analysts did not testify at trial and the prosecution failed to establish that the analysts were both: (1) unavailable to testify at trial and (2) that the defendant had a prior opportunity to cross-examine the analysts, the admission of the certificates violated the Confrontation Clause.

Justice Kennedy was joined in a dissent by Justices Roberts, Breyer and

Alito. Justice Kennedy stated that the majority had created “an as-yet-undefined set of rules governing what kinds of evidence may be admitted without in-court testimony.”³ He also stated that the majority’s ruling “has vast potential to disrupt criminal procedures that already give ample protections against the misuse of scientific evidence.”⁴

The Court rejected the argument that the certificates were outside the Confrontation Clause because they were the result of “neutral, scientific testing” rather than historical events. The Court noted there were reasons why forensic scientists may distort the test results. The Court also rejected the argument that the certificates qualified as official or business records. Likewise, the defendant’s power to subpoena the analysts was not an adequate substitute for the right of confrontation. Finally, the Court stated that the Confrontation Clause could not be limited merely because a ruling makes the prosecution’s responsibilities more burdensome.

As a result of *Melendez-Diaz*, there are a number of potential problems for prosecutors. For example, a forensic analyst’s report on DNA, fingerprints, firearms, blood splatters, paint samples, footprints, etc. would presumably be included within the requirements of *Melendez-Diaz* for the purpose of requiring actual testimony, unless the defense is willing to stipulate to the testimony.

Another issue is whether every person who was involved in the total testing process would be required to testify.

While the majority opinion in *Melendez-Diaz* did state, “we do not hold, and it is not the case, that anyone whose testimony may be relevant in establishing the chain of custody, authenticity of the sample, or accuracy of the testing device, must appear in person as part of the prosecution’s case,”⁵ it is not clear how broadly the Court’s ruling will be applied in California.

Likewise, how strict will the courts be in old cases where one or more of the forensic analysts who were in some way involved with the test are either dead or retired? The *Melendez-Diaz* ruling may require retesting and new reports. Unfortunately, retesting is not always possible or practical.

Finally, there will be litigation to determine to what extent the holding in *Melendez-Diaz* will be applied retroactively in appeals and habeas corpus proceedings in cases arising after *Crawford*.

It is true that laboratory tests are not involved in the majority of prosecutions. Also, in many cases the defense will choose not to challenge forensic evidence or will see no benefit in requiring the testimony of every witness who performed any part in the total examination process.

The United States Supreme Court has already decided to review a Virginia case to determine whether the defense can call a laboratory technician as a witness if the prosecution does not.⁶

On August 24, 2009, the Third Appellate District in *People v. Dungo*⁷ decided that an autopsy report was

1. *Melendez-Diaz v. Massachusetts* (2009) ___ U.S. ___, 129 S.Ct. 2527; 174 L.Ed 314.

2. *Crawford v. Washington* (2004) 541 U.S. 36.

3. *Melendez-Diaz v. Massachusetts*, *supra*, 129 S.Ct. at 2544.

4. *Id.*

5. *Id.* at 2532, fn. 1.

6. See *Briscoe v. Virginia* (2009) ___ U.S. ___, 129 S.Ct. 2858.

7. *People v. Dungo* (2009) 176 Cal.App.4th 1388.

included within the ruling of *Melendez-Diaz*.

On August 18, 2009, the Second Appellate District issued its opinion in *People v. Rutterschmidt*.⁸ In *Rutterschmidt*, the prosecution introduced toxicology results through the testimony of the lab director for the coroner's toxicology lab. The lab director had not personally done the analysis, which had been done by other criminalists acting under his supervision. The lab director did a peer review of the work of each criminalist, then approved the report. The court held that the testimony of the lab director did not violate the Confrontation Clause under *Crawford* or *Melendez-Diaz*: (1) the *Crawford* and *Melendez-Diaz* reasoning does not extend to the rule that an expert can testify to his or her own

opinion based on the work of another expert; (2) *Melendez-Diaz* specifically deals with a situation where no expert testified, a piece of paper was admitted without any live testimony, while here testimony was given by a live witness; (3) *Melendez-Diaz* does not specifically address the situation here, but the majority opinion as a practical matter can go no further than the limits identified by the fifth vote, Justice Thomas, and his concurrence indicates that testimony of this type is not covered by the Confrontation Clause; and (4) both the established California rule about the basis for expert testimony, and the Federal Rules of Evidence, are in accord with the admission of this testimony.

The legal, practical, and fiscal ramifications for prosecutors, courts,

labs, and defense counsel caused by *Melendez-Diaz* may be significant. Only time and additional court interpretations will determine the actual effect of the *Melendez-Diaz* ruling.

W. Scott Thorpe is the Chief Executive Officer for the California District Attorneys Association. He also serves as Executive Director of the Institute for the Advancement of Criminal Justice. Prior to this he was a special assistant attorney general and also a supervising deputy attorney general at the California Department of Justice

8. *People v. Rutterschmidt* (2009) 176 Cal.App.4th 1047.



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CORRECTION: In the printed edition of the Summer 2008 issue of the *IACJ Journal*, acknowledgment of the contributions by Legal Research Assistant Breyon J. Davis to the writing of Jan Scully's article "Victim's Rights in Death Penalty Cases" was inadvertently left out. Our apologies to District Attorney Scully and Ms. Davis for this oversight.

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