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to the
California Commission on the Fair Administration of Justice

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I am professor and chair of the Department of Criminology, Law & Society at the University of California, Irvine. My research focuses on the use of scientific evidence in the courtroom. I have a longstanding interest in forensic science. During the past decade I have spent considerable time investigating and writing about crime laboratory problems, particularly instances in which forensic science has been misused. I also have some experience, as lawyer, litigating cases involving forensic science.

I am pleased to have the opportunity to share with the Commission my perspectives on the current state of forensic science and what might be done to promote a fairer and more effective use of forensic science in the justice system.

Let me begin by saying that forensic science plays a crucial role in the justice system. The quality of justice in our state frequently depends on the quality of forensic science. Unfortunately, the quality of forensic science in this state and elsewhere has been uneven and inadequate. Bad forensic science appears to be one of the most significant factors in causing false convictions (Saks & Koehler, 2005; Scheck, Neufeld & Dwyer, 2000).

There are two underlying problems:

1. **Many areas of forensic science are poorly validated**. Forensic scientists have routinely made claims in court that rest on a weak scientific foundation and that would not be accepted as valid in the broader scientific community. The field is "under-researched and oversold." (Saks & Koehler, 2005; Tobin & Thompson, 2006).

    - Bullet lead testing offers an instructive example. Beginning in the 1960s the FBI laboratory analyzed the metal composition of bullets to determine whether an expended round found at a crime scene could have come from a particular box of ammunition owned by a suspect. Criticism from outside scientists prompted a review of the procedure by the National Research Council, which issued a report (NRC, 2004) saying that the is *no scientific foundation* for the claim, made repeatedly by FBI experts in courtroom testimony, that a bullet can be linked to a particular box of ammunition on the basis of this procedure. In 2005, the FBI terminated its program of bullet lead testing. According to the FBI laboratory director, the decision to discontinue bullet lead analysis was "based primarily on the inability of scientists or manufacturers to definitively evaluate the significance of an association between bullets made in the course of a bullet lead examination." (Thompson, 2005). The problem, of course, is that this important insight into the limitations of the method came only after the FBI had been

performing it for over thirty years and had presented bullet lead evidence in over 2500 cases.

- Similar problems are likely to come to light in other areas of forensic science. Academic critics have questioned the underlying validation of forensic testing and the accuracy of claims routinely made in court in a number of areas, including toolmark examination (Schwartz, 2005), fingerprint examination (Cole, 2004; 2005), bitemark analysis (Saks, 1998), gunshot residue testing (Nethercott & Thompson, 2005), arson investigation (Lentini, 1999; Lenini, Smith & Henderson, 1993), and low-copy number DNA testing (Gill et al. 2006).

2. **An extraordinary number of scandals have occurred in which forensic scientists have been caught engaging in scientific misconduct, making false claims, suppressing exculpatory data, and following poor scientific practices.**

- These problems have occurred at both public and private laboratories and have involved a wide array of forensic disciplines (Giannelli, 1997; Cooley, 2004; Thompson, 2006; *see also* cases compiled at http://www.corpus-delicti.com/forensic_fraud.html).

- These problems have not been limited to isolated, backward or poorly funded laboratories. For example, the FBI laboratory, which is well-funded and staffed by well-qualified and well-connected personnel has had some of the more serious problems (Kelly & Wearne, 1998; OIG Report, 1997; 2004).

Here are my thoughts on what the California State legislature might do about these problems.

Industry Self-Regulation is Not the Answer

Forensic scientists have made efforts to regulate themselves through certification programs, systems of laboratory accreditation, promulgation of guidelines and standards of practice, ethical review panels and the like. These efforts can be helpful but are entirely inadequate to address the underlying problems. Self-regulation has *not* been sufficient in the past and will *not* be sufficient in the future.

Having employees of forensic laboratories "accredit" or "certify" each other is unlikely to solve the kind of problem that existed with bullet lead testing. When whole areas of forensic science are poorly validated and entire categories of forensic testimony rest on shaky scientific foundations, asking the forensic scientists who work within those areas to regulate one another is akin to asking the blind to lead the blind.

In these weak areas, systems of certification and accreditation can actually do more harm than good by closing the field to academic scientists who would approach it with greater

skepticism and scientific rigor. Accreditation and certification can become code words for a system of exclusion in which the only experts deemed qualified to testify in a particular area are an elect group of insiders.

When the real problem is the failure of experts in the area to validate their methods and techniques, a system that shuts out testimony by outsiders does more to perpetuate problems than to solve them. It increases the insularity and group-think that contributed to the problems in the first place. The real solution is to expose the practices of the field to careful *outside* scrutiny by academic scientists, as happened in the case of bullet lead testing (albeit 30 years too late).

Academic scientists who look closely at the practices of forensic scientists often raise serious concerns about their quality. For example, they often criticize forensic scientists for failing to take adequate measures to control for "observer effects" or "confirmation bias"—that is, for the human tendency to see what one expects and/or desires to see (Risinger, Saks, Thompson & Rosenthal, 2002).

Observer effects have been the source of a great deal of scientific error and self-deception. In his iconic book *Galileo's Revenge: Junk Science in the Courtroom* (1991), Peter Huber traced several false scientific theories to misinterpretation of data arising from uncontrolled observer effects. A scientist who is committed to a pet theory inevitably (and unconsciously) interprets data in a manner consistent with that theory. By Huber's account, uncontrolled observer effects are one of the hallmarks of junk science.

Unfortunately, this hallmark of junk science is common practice in the field of forensic science (Risinger et al., 2002). When I review DNA laboratory notes, for example, I often see comments that suggest that the analysts interpreting DNA tests are well aware of (and deeply involved in) the facts of the underlying case. They have strong reasons to expect (and perhaps even desire) certain findings before conducting the tests. This is not an optimal situation for maintaining scientific objectivity. In fact, some serious problems in forensic science have been attributed to uncontrolled observer effects, such as the FBI's false fingerprint identification that linked Oregon lawyer Brandon Mayfield to the Spanish train bombing (Thompson & Cole, 2005).

While academic scientists generally take careful steps to control for observer effects, such as conducting studies in a "blind" or even "double-blind" manner, forensic scientists rarely do so. Procedures for blind interpretation of forensic science data would not be difficult to implement. Tobin & Thompson (2006) have described a number of easy ways that forensic scientists could deal with observer effects, if they cared to do so.

The persistence of this "junk science" approach to evidence interpretation is another example of in insularity of forensic science and the need for input from outside scientists. Self-regulation by forensic scientists is unlikely to address this problem because it is a problem of the field as a whole. Forensic scientists have ignored this problem for decades. None of the accreditation standards in any field of forensic science address this important issue.

The limitations of self-regulation are also apparent in the frequent failure of forensic scientists to detect and expose fraudulent conduct by their colleagues. Cases in which forensic scientists were proven to have engaged in scientific fraud, such as fabrication of test results, are surprisingly common (Giannelli, 1997; Kelly & Wearne, 1998; Cooley, 2004; Thompson, 2006). A striking feature of these fraud cases is how few were exposed by forensic scientists. Most of the cases were exposed only after extraordinary circumstances, such as post-conviction DNA exonerations, revealed the innocence of a person convicted by the fraudulent evidence (Scheck *et al.*, 2000). If self-regulation is inadequate for policing outright scientific fraud, it is unlikely to be effective for controlling testimony that, though not intentionally dishonest, is exaggerated and misleading.

The Importance of an Open and Transparent Legal Process

The worst crime laboratory scandals have occurred in jurisdictions that place serious limits on criminal discovery and that make it difficult for defense lawyers to obtain expert assistance to review forensic evidence. This is not a coincidence. Long experience has shown that scientific work is strengthened by outside criticism and becomes weak and biased when shielded from scrutiny.

For example, it is now recognized that the Houston Police Department (HPD) Crime Laboratory did grossly inadequate, incompetent and biased DNA and serology work for well over a decade before a team of *television journalists* exposed the problems in late 2002 (Bromwich, 2005; 2006a; 2006b). A crucial question to consider is why these problems were not brought to light during criminal trials. Why didn't the defense lawyers whose clients were incriminated by this shoddy evidence expose the problems? Why did it take journalists (and TV journalists at that) to uncover a problem that should have been caught by the justice system itself?

The answer is that the defense lawyers never knew about the problems. They rarely obtained access to the underlying laboratory records needed to evaluate the laboratory's work and rarely had expert assistance to perform such an evaluation. Restrictive rules of criminal discovery, and lack of funding for defense experts, created a situation in which the defense bar could not effectively perform its watchdog function. The adversary process can only work if both sides have relatively equal resources and access to information. Restrictions on discovery and funding of defense experts undermine the ability of the justice system to function as a quality control mechanism.

In California, defense lawyers have generally had an easier time obtaining discovery and expert assistance than defense lawyers in Texas. However the situation here is far from ideal. In the area of DNA testing, laboratories sometimes fail to maintain or refuse to turn over electronic data files that are crucial for doing an effective independent review of the test results. Laboratories also routinely refuse to disclose contamination logs and

corrective action files. (For more information on the importance of these files, and of electronic DNA data, see Thompson, 2006).

The most serious problems of discovery, however, relate to government DNA databases. I expect that you will hear more about this issue from Bicka Barlow. In my view, misguided and unnecessary efforts to protect the privacy interests of people in the database have unfairly and inappropriately limited the ability of accused individuals and their lawyers to examine and evaluate the state's databases. By shrouding the database in unnecessary secrecy, we are undermining the ability of the justice system to perform its traditional watchdog function in ways that may ultimately undermine confidence in DNA testing.

The Need for External Scrutiny of DNA Databases

I have long advocated public disclosure of the DNA profiles contained in government offender databanks such as California's convicted offender databank. In my view, the DNA profiles should be made available to the scientific community in anonymous (de-identified) form for the purpose of scientific study. Disclosure of these profiles would be helpful for addressing important scientific questions concerning the rarity of DNA profiles and the likelihood of coincidental matches—questions that relate to the fundamental value of a DNA "match" in a criminal case. Additionally, as explained below, disclosure of the profiles would open the government's DNA databank operations to external scrutiny that could identify potential problems with their accuracy and reliability. So long as the profiles are identified only by number and cannot be associated with any particular individual, I see no convincing ethical or social reason for keeping them secret.

A DNA profile is simply a list of numbers that identifies the alleles (genetic markers) that an individual possesses at a set of loci (locations) on the human genome. As an illustration, I have listed below the nine-locus DNA profile of an anonymous criminal offender. It is simply a list of numbers stored on a computer and is somewhat

Locus	D3	vWA	FGA	D8	D21	D5	D13	D7	D16
Offender #1	15,15	14,16	19,25	13,15	30,31.2	12,12	9,13	8,12	11,12

analogous to a social security number. The major difference I see between a social security number and a DNA profile is that public disclosure of anonymous social security numbers can lead to abuses. For example, someone might use an anonymous social security number to establish credit, thereby detrimentally affecting the credit record of the anonymous individual. By contrast, I can see no way in which disclosure of an anonymous DNA profile, or a set of such profiles, could harm anyone.

I am aware of at least one government databank containing offender profiles that has been disclosed to outside experts and circulated within the scientific community. To my

knowledge, no problems of any kind resulted from this disclosure. The government of Victoria, Australia compiled that databank, which consists of nearly 20,000 DNA profiles. That databank is currently on the hard drive of my computer. I have examined the databank myself and shared the databank with other experts who conducted their own analyses. I have presented results of those analyses at scientific meetings in Australia as well as the United States. In my opinion, those analyses are extremely valuable both for frequency estimation purposes and for purposes of identifying potential problems in the government's databanking system.

For example, analysis of the Victorian databank found a large number of duplicate profiles, which was expected. What was not expected, and indicated a potential problem, was the discovery of a large number of DNA profiles that matched on every allele but one—a result that could not be explained by the presence of relatives in the database. In my scientific presentations I have suggested that this finding most likely arose from mistyping of some of the duplicate samples in the databank and therefore points to quality control problems in the underlying genetic assays. This conclusion obviously has important implications regarding the fundamental reliability of the DNA typing procedures being used in Australia. It would not surprise me at all if similar problems were found through the examination of databanks in the United States.

I see no good reason for the government to throw a shroud of secrecy around the profiles in state databanks. For several years I have been asking experts in the field of forensic DNA testing whether they can imagine any harm that might arise either to the interests of the government or to the interests of an individual from the disclosure of the de-identified profiles contained in a government databank. No one has been able to identify any such harm. In fact, no one has been able to identify any legitimate interest that could be compromised by disclosure of anonymous DNA profiles. I have discussed the issue with leading civil liberties experts, such as Tania Simoncelli of the ACLU. Ms. Simoncelli agrees that the DNA profiles in state databases should be made available in anonymous form for public examination.

Forensic Science Commissions

I support the idea of a state commission to oversee forensic science. For reasons already stated, however, I believe it is crucial that such a commission include significant representation by academic scientists. ***The commission must not be dominated by forensic scientists.*** A forensic science commission run by and for forensic scientists is simply another form of self-regulation by forensic science. It has all of the problems I have already discussed with industry self-regulation.

I have followed closely the operation of the state of Virginia's new Forensic Science Board and Scientific Advisory Committee. I have not been impressed. The Scientific Advisory Committee is utterly dominated by individuals who make their living as forensic scientists. They have ignored and voted down reform-minded proposals offered by the few academic scientists who are members. The Forensic Science Board has

refused my request to review forensic work in two capital cases in which I have discovered serious scientific problems. So far, the Board seems more interested in placing an imprimatur on existing practices than dealing seriously with alleged problems. I would rather see California do nothing than replicate what exists in Virginia.

In my view an approach like Virginia's could work very well, however, if the Scientific Advisory Committee included a larger number of independent academic scientists. The majority of board members should be university professors with strong scientific credentials in relevant underlying disciplines, like biology, chemistry and medicine. If our goal is to raise the level of forensic science practice, there must be strong representation from those outside the current forensic science community.

Innocence Commissions

I fully support creation of state-level commissions with authority to investigate the factors underlying known miscarriages of justice. There is a great deal to be learned from DNA exonerations, and other cases in which events reveal a miscarriage of justice. These events open an extraordinary window into the operation of the justice system and reveal, better than any other method, how it can go wrong. Academics like myself who attempt to look into these cases often have difficulty obtaining full access to information needed to understand a case. A state level commission with statutory authority to obtain relevant records and interview relevant individuals would help assure that we learn the important lessons these cases have to offer. Creation of such a commission would be an important contribution to the cause of justice in California.

Respectfully submitted,

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