



TARNISH ON THE 'GOLD STANDARD': UNDERSTANDING RECENT PROBLEMS IN FORENSIC DNA TESTING

DNA evidence has long been called “the gold standard” of forensic science. Most people believe it is virtually infallible — that it either produces the right result or no result. But this belief is difficult to square with recent news stories about errors in DNA testing. An extraordinary number of problems related to forensic DNA evidence have recently come to light. Consider, for example, the following:

- The Houston Police Department (HPD) shut down the DNA and serology section of its crime laboratory in early 2003 after a television expose revealed serious deficiencies in the lab’s procedures, deficiencies that were confirmed by subsequent investigations. Two men who were falsely incriminated by botched lab work have been released after subsequent DNA testing proved their innocence. In dozens of cases, DNA retests by independent laboratories have failed to confirm the conclusions of the HPD lab. The DNA lab remains closed while an outside investigation continues.¹



- In Virginia, post-conviction DNA testing in the high-profile case of Earl Washington, Jr. (who was falsely convicted of capital murder and came within hours of execution) contradicted DNA tests on the same samples performed earlier by the State Division of Forensic Sciences. An outside investigation concluded that the state lab had botched the analysis of the case, failing to follow proper procedures and misinterpreting its own test results. The outside investigators called for, and the governor ordered, a broader investigation of the lab to determine whether these problems are endemic. Problematic test procedures and misleading testimony have also come to light in two additional capital cases handled by the state lab.²
- In 2004, an investigation by the *Seattle Post-Intelligencer* documented 23 DNA testing errors in serious criminal cases handled by the Washington State Patrol laboratory.³
- In North Carolina, the *Winston-Salem Journal* recently published a series of articles documenting numerous DNA testing errors by the North Carolina State Bureau of Investigation.⁴

- The Illinois State Police recently cancelled a contract with Bode Technology Group, one of the largest independent DNA labs in the country, expressing “outrage” over poor quality work.⁵
- LabCorp, another large independent lab has recently been accused of botching DNA paternity tests.⁶

While these scandals are bad enough, the problems with DNA evidence do not end there. A close look at the field shows that DNA testing errors have been popping up all over the country. Many of the mistakes arise from

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cross-contamination or mislabeling of DNA samples. Problems of this type have been documented in Minnesota,⁷ North Carolina,⁸ Pennsylvania,⁹ Nevada,¹⁰ and California.¹¹ Tellingly, one of the private labs hired to retest DNA evidence in cases that were botched by the Houston Police Department Crime Lab has itself produced false matches due to sample mix-ups.¹² A particularly ominous sign of underlying problems is that accidental transfers of DNA among samples from *different cases* being processed by the same laboratory have produced several false “cold hits.”¹³

While most of the problems are due to inadvertent mistakes, a number of cases involving dishonesty have also come to light. DNA analysts have recently been fired for scientific misconduct, and specifically for falsification of test results, by a number of forensic laboratories, including labs operated by the FBI,¹⁴ Orchid-Cellmark (another large private DNA laboratory),¹⁵ the Office of the Chief Medical Examiner in New York City,¹⁶ and the United States Army.¹⁷ In all of these cases, the analysts were caught faking the results of control samples designed to detect instances in which cross-contamination of DNA samples has occurred.

So what is going on with DNA testing? How can we explain this sudden rash of problems with “the gold standard” of forensic science? How can a test that has long been advertised as virtually infallible produce so many errors? And what is behind the recent spate of dishonesty among DNA analysts? The answers to these questions are, in my view, interconnected. Some serious underlying problems with DNA testing that have existed for a long time are beginning to come to light. What we are seeing is not a sudden deterioration in the quality of DNA testing. It is the inevitable emergence and recognition of problems that existed all along but heretofore were successfully hidden. In this article, I will describe these underlying problems, comment on why they are occurring, and discuss what defense lawyers can do about them.

Bad Labs

One chronic problem that is now being recognized is the uneven quality of forensic DNA laboratories. Laboratories vary greatly in the care with which they validate their methods and the rigor with which they carry them out. Quality control and quality assurance procedures that are followed religiously in some labs are ignored or followed intermittently in others.

While there have always been bad labs, their shoddy work has been difficult to detect because the worst labs tend to be found in jurisdictions that have historically shielded crime labs from external 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 2002.¹⁸ Defense lawyers did not (and probably could not) expose the lab’s problems because Harris County (Houston) judges routinely denied requests for discovery of underlying laboratory notes and for expert assistance in evaluating DNA evidence. Indeed, under a policy of the Harris County District Attorney’s Office, that defense lawyers rarely challenged, the defendant could not even get a copy of laboratory reports in his case until the trial began.

Crime labs in Virginia and North Carolina have also received little scrutiny in the justice system due to severe limitation in those states on the availability of discovery, funding for independent experts, and funding for indigent defense in general.

But these problems could not remain hidden forever. Journalists have played a big role. In Houston, the problems were first exposed in a series of exposes by television reporters who were assisted by academic experts. Excellent investigative journalism also helped expose problems in Washington State, Virginia and North Carolina. Another important factor has been post-conviction DNA testing. A number of errors have come to light because post-conviction DNA tests contradicted tests performed by government crime labs. The work of Peter Neufeld, Barry Scheck, and their colleagues at the Cardozo Law School Innocence Project has been instrumental in exposing problems, particularly in Texas and Virginia.

Surprising Frequency Of Cross-Contamination And Sample Mix-Ups

Another problem now emerging into the light is an unexpectedly high rate of laboratory errors involving mix-up and cross-contamination of DNA samples. Errors of this type appear to be chronic and occur even at the best DNA labs. This is a problem that forensic scientists have largely managed to keep under wraps (perhaps because it is always embarrassing). Practitioners have long claimed that the rate of laboratory

error in DNA testing is so low as to be negligible, but growing evidence suggests otherwise.

An important source of evidence on the nature and frequency of these problems is “contamination logs” and “corrective action files” that are maintained by some DNA laboratories. Under a guideline issued by the FBI’s DNA Advisory Board in 1998, forensic DNA laboratories are required to “follow procedures for corrective action whenever proficiency testing discrepancies and/or casework errors are detected” and “shall maintain documentation for the corrective action.”¹⁹ While many laboratories ignored this guideline, some laboratories (probably the better ones) have begun to keep records of instances in which, for example, samples are mixed up or DNA from one sample is accidentally transferred to another samples.

The surprise for defense lawyers who have managed to gain access to these files is how voluminous they are. Errors occur regularly. Files from Orchid-Cellmark’s Germantown, Maryland facility, for example, show dozens of instances in which samples were contaminated with foreign DNA or DNA was somehow transferred from one sample to another during testing. I recently reviewed the corrective action file for an accredited California laboratory operated by the District Attorney’s Office of Kern County (Bakersfield). Although this is a relatively small laboratory that processes a low volume of samples (probably fewer than 1,000 per year), during an 18-month period, it documented multiple instances in which (blank) control samples were positive for DNA, an instance in which a mother’s reference sample was contaminated with DNA from her child, several instances in which samples were accidentally switched or mislabeled, an instance in which an analyst’s DNA contaminated samples, an instance in which DNA extracted from two different samples was accidentally combined into the same tube, falsely creating a mixed sample, and an instance in which a suspect tested twice did not match himself (probably due to another sample-labeling error).

The errors documented in these files are disturbing, in part, because they probably represent just the tip of an ominous iceberg. The documented errors are, of course, those that the laboratory itself caught and corrected. In most instances, these errors produced unexpected results that flagged the problem, such as positive results in a control sample that was supposed to contain no

DNA or a second DNA profile in a sample that was supposed to be from a single person. Upon noticing such problems, labs typically throw out the results of that test and start over. Accordingly, analysts usually argue that most of the incidents documented in these files are “not really errors” because they did not affect the final results of the analysis and, in fact, are evidence that “the system is working” to detect errors when they occur.

However, the same processes that cause detectable errors in some cases can cause undetectable errors in others. If DNA from a suspect is accidentally transferred into a “blank” control sample, it is obvious that something is wrong; if the suspect’s DNA is accidentally transferred into an evidentiary sample, the error is not obvious because there is another explanation — *i.e.*, that the suspect is the source of the evidentiary DNA. Errors that incriminate a suspect are unlikely to be detected as errors; they are likely to be treated as incriminating evidence. Consequently, the fat files full of errors that a lab was able to catch should not be taken as reassuring evidence that “the system is working.” They are a warning signal that we need to worry about errors the lab did not catch.

Dishonest DNA Analysts

A third problem now emerging is dishonest DNA analysts who falsify test results. I suspect this third problem is closely related to the second problem: DNA analysts are faking test results to cover up errors arising from cross-contamination of DNA samples and sample mix-ups.

Given the unexpectedly high frequency of contamination in DNA testing we have just discussed, it is interesting, and not at all surprising, that the major form of fakery discovered to date involves control samples known as extraction blanks that are designed to detect contamination. These samples are supposed to contain no DNA. When they produce positive results, it indicates there was a problem — DNA somehow ended up in a sample where it did not belong. If that happened to a control sample, it could also have happened to other samples, so the analyst must throw out the whole test and start over.

The temptation to fake controls probably arises partly from production pressures and partly from the collision between the public image of DNA testing as infallible and the reality that it is easier than one might expect to botch a DNA test by cross-contaminating samples. Police and prosecutors have

demanding DNA tests in an ever-expanding number of cases, putting pressure on labs to keep pace. Some labs have become high-tech sweatshops in which analysts are under pressure to maintain productivity.²⁰ In this environment, the failure of a scientific control can be a big problem for a DNA analyst — it forces the analyst to redo the entire case, putting him or her behind schedule.

Furthermore, the presence of DNA in an extraction blank can be embarrassing for an analyst because contamination is often the result of sloppy laboratory technique. Having to redo the analysis can also lead to uncomfortable questions about why the analyst needed two or more tries to get the test right. DNA tests themselves are viewed as infallible, so any problem that occurs in testing tends to be attributed (fairly or not) to the analyst’s incompetence. Consequently, a single mistake can end an analyst’s career. After an accidental sample switch caused an embarrassing false incrimination in a North Carolina case, for example, the lab director reported that “the analyst working this case was removed from casework through retirement” and “will not be reemployed by this agency to conduct any type of forensic testing.”²¹

So what is a DNA analyst to do if problems (such as positive results in blank control samples) occur too often? For an analyst who thinks that the test results are right anyway, it must be very tempting just to hide the problem. This can be done in a number of ways. The DNA analysts in the Houston Police Crime lab came up with an easy solution — they simply failed to run extraction blanks (although they claimed in testimony that they had run all necessary controls).

According to the Inspector General of the Justice Department, FBI analyst Jacqueline Blake followed only a slightly more subtle approach. Although she prepared extraction blanks along with other samples and recorded the creation of these samples in her notes, she dumped the portion of these samples that might have contained contaminating DNA before sending the samples through the computer-operated genetic analyzer that typed the DNA. Interestingly, although Blake’s misconduct could have been detected by close examination of the electronic files produced by the genetic analyzer, no one either inside or outside the Bureau checked this aspect of her work. Hence, “Blake’s record of contamination-free testing for more than two years did not

receive scrutiny.”²² The analyst fired by the Office of the Chief Medical Examiner in New York used a similar strategy and was caught only after confiding her activities to another analyst, who then made an anonymous report to the laboratory managers.

Analyst Sarah Blair of Orchid-Cellmark used yet another approach. She manipulated the computer files produced by the genetic analyzer, replacing the computerized results for problematic control samples with the results of “clean controls” from other cases. This manipulation was uncovered when another Orchid-Cellmark analyst who reviewed Blair’s work noticed that the same control file (which happened to contain an unusual anomaly) appeared in two different cases. According to Robin Cotton, a Technical Director for the lab, a subsequent review of computer files in Blair’s cases found approximately 25 instances in which Blair had substituted controls.²³ Dr. Simon Ford, an independent DNA consultant in San Francisco who has reviewed some of Blair’s work for the Los Angeles County Public Defender’s Office, has reported finding additional instances of data manipulation in Blair’s cases based on close examination of printouts of the computer data.²⁴ Dr. Ford also recently reported discovering a case in which an Arizona DNA analyst surreptitiously manipulated computer files in order to cover up an error involving mislabeling of samples.²⁵

What Defense Lawyers Need To Do

Criminal defense lawyers can play a key role in further exposing DNA testing problems and advocating for laboratory reform. The first step, when handling a case involving DNA evidence, is to fight relentlessly for full disclosure of the underlying laboratory records and for appointment of an independent expert to help review those records. As noted above, some of the worst laboratory work, such as flawed DNA testing by the Houston Police Department Crime Laboratory, has occurred in jurisdictions where laboratory work has rarely received outside scrutiny. Analysts who know that no one will ever check or challenge their conclusions tend to become sloppy, to cut corners, and to shade their findings in ways they find convenient. The criminal defense bar has an important role to play in maintaining the quality of forensic science, but can only play that role if defense lawyers forcefully assert their clients’ Sixth Amendment right to examine the evi-

dence against them.

Discovery Of Electronic Data

A key aspect of discovery in DNA cases is the electronic data produced by the computer-controlled genetic analyzers that are currently used to “type” DNA samples. Analysis of the computer files can not only reveal undisclosed problems and support alternative interpretations of the findings, but also, as discussed above, these files can be crucial for detecting instances of scientific fraud, such as that committed by Jacqueline Blake and Sarah Blair. One of the ironies of the Sarah Blair case is that Orchid-Cellmark has long resisted providing full disclosure of electronic files in its cases. Although Orchid-Cellmark has generally, when asked, made a partial disclosure of electronic files, their disclosure is less complete than that routinely provided by other labs, including the FBI. According to Dr. Simon Ford, Sarah Blair’s misconduct might well have been noticed earlier by independent analysts had Orchid-Cellmark been more open about its work. Hence, the Blair case is another instance in which absence of external scrutiny helped hide problems.

The great majority of forensic DNA laboratories in the United States will, on receiving a proper request, provide complete copies of the electronic data in a case. The electronic files are typically burned onto a CD-Rom in a simple operation similar to copying digital music or photos. Although the files are in a proprietary format that is readable only by software created by vendors of the genetic analyzers, a number of independent experts have access to this software and can use it to reanalyze the results from the genetic analyzer, check the lab’s interpretations, and look for other problems.

In a few jurisdictions government labs have adamantly refused to disclose electronic DNA testing data, citing fears that defense counsel and their experts will misuse it. The Deputy Director of the Michigan State Police issued a statement on May 12, 2005 opposing “the allowance of releasing raw electronic data for subsequent manipulations using software and parameters not validated by the Michigan State Police Forensic Laboratory” and declaring that “it is the position of the Michigan State Police Forensic Science Division that any release of this (*sic*) data for processing with non-validated parameters is tantamount to evidence tampering.”²⁶

The claim that defense reanalysis of electronic data could, under any circum-

stances, amount to “evidence tampering” is absurd given that defense experts work only with a copy of the original data. By analogy, if the police disclosed digital photos of the crime scene, it would hardly be “data tampering” for a defense expert to manipulate the digital images in an effort to enhance them or bring specific details into focus. Nor should the government be able to dictate the software and “analysis parameters” used by a defense expert to examine the government’s digital data. The use of proper analysis parameters might well become an issue if and when the defense decided to offer into evidence the results of its analysis of the electronic data. But to deny access to digital data on grounds that the defense *might* analyze it improperly eviscerates the right to discovery.

Taking Contamination Seriously

After obtaining complete laboratory records in the case, defense lawyers need to review them carefully with the assistance of an expert in order to identify all possible explanation for the laboratory findings that might be consistent with innocence. In light of the frequency of contamination and mislabeling problems, it is particularly important to consider whether accidental cross-contamination or mislabeling of samples could account for incriminating findings.

One sure pathway to a false incrimination is accidental contamination of an evidentiary sample with DNA from a suspect’s reference sample. Given the known danger of cross-contamination among samples being processed together as a batch, most DNA laboratories take care to process the evidentiary samples at a different time or place than reference samples. However, some laboratories (the bad ones) insist on processing reference samples and evidentiary samples from a case all at the same time, a practice that seems irresponsible, even outrageous, given the danger that a laboratory accident could produce a false incrimination.

A false incrimination can also occur through cross-contamination among evidentiary samples. Even labs that are careful to test reference samples separately from evidentiary samples often process all of the evidentiary samples from a case together, creating the potential for false matches. I recently reviewed a case processed by the Los Angeles Police Department DNA laboratory in which samples from a bloody murder scene were being processed in the same batch as samples from items collected in a suspect’s house. Due to an analyst’s

error in the case, DNA from the murder victim accidentally ended up in a control sample. This error was detected because the control sample was a “blank” which was supposed to contain no DNA. However, it was merely happenstance that the accidental transfer of DNA ended up in a blank control rather than another sample in the same batch. If the victim’s DNA had instead ended up in one of the samples from the suspect’s house, I believe that the error would not have been detected and would have led to a false laboratory report saying that the murder victim DNA had been found on an item collected in the suspect’s house. Defense lawyers need to think carefully about the potential for such errors because experience shows that they can and do occur.

In several instances accidental cross-contamination of DNA samples in a laboratory have caused false “cold hits” (*i.e.*, false matches to an individual who was identified only because his or her DNA profile was in a government database). For example, the Washington State Patrol laboratory accidentally contaminated samples from a rape case with DNA from the reference sample of a juvenile felon. Luckily, the case in question was an old one. Because the juvenile offender had been a young child when the rape occurred he could not plausibly be connected to the case. According to the lab’s Contamination/Extraneous DNA Log, “it was determined that the felon’s sample was being used as a training sample by another analyst” when the rape case was being analyzed. In the Orange County, California, Sheriff-Coroner’s crime lab an analyst accidentally cross-contaminated samples from two rape cases being processed at the same time, producing another false cold hit. False cold hits due to accidental cross-contamination of samples from different cases have also been reported in New Zealand²⁷ and Australia.

In one particularly interesting Australian case, DNA on the clothing of a murdered toddler named Jaidyn Leskie was linked, via a “cold hit,” to a young “mentally challenged” woman who lived hundreds of miles away and who, by all accounts, had never left her own village. Police could find no way to link the young woman to the Leskie murder and at first dismissed the “cold hit” as an “adventitious” (coincidental) match. However, a coroner’s investigation established that DNA from the young woman had been processed through the same laboratory at about the same time as the toddler’s clothing. The young woman

had allegedly been the victim of a sexual assault involving a condom. Although laboratory personnel maintain that accidental transfer of samples between cases is impossible, it now appears almost certain that the young woman's DNA from the outside of the condom accidentally contaminated samples from the toddler's clothing. The alternative explanation — that there was a coincidental match between the young woman and another person who was involved with the toddler's murder — has become increasingly unlikely because additional DNA testing, and re-analysis of the lab's electronic data, has reduced the likelihood of such a coincidence to one in many trillions.²⁸

The facts of some recent cases in the United States have also raised suspicions about false cold hits due to contamination across cases. For example, in 2002, while investigating the 1969 murder of University of Michigan law student Jane Mixer, the Michigan State Police Crime Laboratory in Lansing found DNA of two men on her clothing. The profiles were searched through a database and matched two Michigan men, Gary Leiterman and John Ruelas. Police immediately suspected that Leiterman and Ruelas had been involved in the murder, but there was a problem — Ruelas was only four years old when Mixer was killed and had been living with his parents in another city. According to news accounts, police could find no link between young Ruelas and Mixer.²⁹ That did not deter Washtenaw County Assistant Prosecutor Steven Hiller who charged Leiterman with the murder. Hiller "created a scenario placing a young Ruelas at the [murder] scene as a chronic nose-bleeder whose blood dropped on Mixer."³⁰ There is, however, another possible explanation for this "cold hit." Examination of laboratory records revealed that known samples of DNA from both Leiterman and Ruelas were being processed in the Michigan State lab on the same day as the old samples from the Mixer murder.³¹ Both men were being tested in connection with other cases unrelated to the Mixer murder. Although the Michigan State laboratory maintains that cross-contamination of samples across cases was impossible, it seems a very strange and unlikely coincidence that two men who, according to the prosecutor, were present when Mixer was murdered in 1969 just happened to have their DNA tested (for other cases) on the very same day as samples from the Mixer case were tested. Leiterman was nevertheless convicted of Mixer's murder in 2005.

Lawyers who represent clients who are incriminated through "cold hits"

would be well advised to investigate carefully whether a laboratory accident could explain the test results. In such cases it is crucial to know where your client's DNA has been and to ascertain whether samples taken from your client in connection with any other matters might have crossed paths in the laboratory with the evidentiary samples that were later found to contain incriminating DNA from your client.

Publicizing Problems

Defense lawyers are often among the first to know about problems in forensic laboratories because they encounter these problems when reviewing cases. While the primary obligation, on finding evidence of a lab problem, is of course to use that evidence to advocate effectively for the client, it is vital that defense lawyers also bring such evidence to the attention of the broader legal and scientific community so that underlying problems can be recognized and addressed. An excellent way to share evidence about lab problems with other defense lawyers is to upload copies of relevant documents (e.g., transcripts, lab reports, lab notes) to the on-line Forensics Library operated jointly by the NLADA and NACDL at www.nlada.org/Defender/forensics.³²

Potential Reforms

Defense lawyers should also play an active role in advocating for laboratory reform. Perhaps the sole positive aspect of the recent spate of DNA testing problems is that legislators, judges, and even prosecutors are gradually becoming aware of underlying problems in forensic science, making this an opportune time to press for reforms.

One such reform is the creation of independent commissions to supervise the operation of forensic laboratories. New York state's successful forensic science commission is a good model. It is encouraging that, in the wake of crime lab scandals in those states, Texas and Virginia have both recently adopted similar legislation. The Virginia legislation creates a scientific review panel with the authority to review laboratory operations, adopt qualification standards for the lab director and other staffers, and establish an audit process to be used when errors occur. The panel will also be available to review lab reports and test results at the request of the governor or lab officials. Virginia Governor Mark Warner (D) signaled his seriousness about improving the quality of forensic DNA testing in the state by appointing a prominent academic critic of forensic

DNA labs (Professor Dan Krane of Wright State University) to the scientific review panel. Fittingly, upon being appointed, Krane told journalists that he intended to be "an advocate of openness," saying he would explore ways to make sure laboratory work could be independently evaluated.³³

This very positive development in Virginia would never have happened without the effective advocacy by members of the defense bar. Steven Benjamin and Betty Layne DesPortes of Richmond played a particularly important role in advocating for reform, as did Peter Neufeld and Barry Scheck of the Innocence Project. The time is now ripe to continue the reform movement and help spread Professor Krane's commitment to scientific openness to regressive jurisdictions such as Michigan, where state officials continue to pursue policies designed to cloak the work of forensic laboratories in secrecy. Another reform worth pursuing is external blind proficiency testing of forensic DNA laboratories. Although most DNA laboratories participate in periodic proficiency tests, these are open tests in which the analysts know that they are being tested. These tests have also been criticized as too easy to detect problems that might arise in tough casework. A better approach is to occasionally ask the lab, without the analysts' knowledge, to analyze a simulated case that is constructed to test the lab's performance.

In 1992, the National Research Council called for external, blind DNA proficiency tests "that are truly representative of case materials (with respect to sample quality, accompanying description, etc.)."³⁴ Thereafter, the Federal DNA Identification Act of 1994 required the director of the National Institute of Justice (NIJ) to report to Congress on the feasibility of establishing such a testing program for DNA laboratories. The National Institute of Justice funded a major study of this issue in which small-scale blind proficiency tests were conducted to assess their practicality and costs. The study found that blind proficiency testing is possible, although somewhat difficult to administer.³⁵ The estimated annual cost of administering two blind proficiency tests (involving simulated cases) to each of the 150 DNA testing laboratories in the United States was only \$450,000 to \$3,020,000 which seems easily affordable. The move toward external blind proficiency testing lost momentum, however, when an NIJ scientific advisory board concluded that such a program would not be worth the

trouble.³⁶ Ironically, the key arguments advanced for this position were that laboratory errors occur so rarely that proficiency tests would be unlikely ever to catch them and that effective alternative methods exist for maintaining the quality of DNA laboratory work. Both of these arguments have been cast in serious doubt by subsequent events. In light of the serious problems that have recently come to light in forensic DNA laboratories, it is high time to revisit the issue of external blind proficiency testing.

Conclusions

DNA evidence is difficult to challenge in the courtroom because most people think it is virtually infallible. It is not just jurors, fed on a media diet of *CSI*-style fantasies, who think so. Most members of the academic and legal community believe it as well. Even scholars who are critical of other areas of forensic identification science have argued that DNA is an exception—calling DNA testing “a model for scientifically sound identification science.”³⁷

While there is no doubt that DNA testing rests on a stronger scientific foundation than many other forensic disciplines,³⁸ recent events have proven that DNA evidence is hardly infallible. The solid scientific foundation for DNA testing is no guarantee that DNA tests will be carried out in a reliable manner that produces accurate results. Bad laboratory work is all too common and laboratory accidents and errors can occur even in good labs. Whether DNA evidence is trustworthy is a question that must be examined carefully in each case. And that challenging task falls ultimately on the shoulders of lawyers who represent clients incriminated by DNA tests.

Notes

1. The HOUSTON CHRONICLE maintains an archive of articles about the scandalously bad work of the Houston Police Department Crime Laboratory at www.chron.com/content/chronicle/special/03/crimelab/index.html.

2. The VIRGINIAN-PILOT and the RICHMOND TIMES-DISPATCH have published a series of news article and editorials about DNA testing problem in the Virginia State Division of Forensic Sciences. See, e.g., *Confusion over DNA a threat to Justice*, VIRGINIAN-PILOT, Aug. 29, 2005; Frank Green, *Study will assess whether errors in Washington case are 'endemic to the system.'* RICHMOND TIMES-DISPATCH, June 14, 2005; *Alarming indifference from crime lab boss*, VIRGINIAN-PILOT, May 10, 2005.

3. See news stories collected at:

<http://seattlepi.nwsourc.com/specials/crimelab/>

4. See stories collected at: <http://crimeandscience.journalnow.com>; see also, Phoebe Zerwick, *State crime lab is faulted: Lawyers' group calls for probe, cites DNA errors in three cases*, WINSTON-SALEM JOURNAL, July 20, 2005.

5. See Frank Green, *Mistakes by state DNA firm alleged: The Illinois State Police, 'outraged' by findings, end their contract with the firm*. RICHMOND TIMES-DISPATCH, August 20, 2005.

6. Tom Jackman, *Paternity Suit Raises Doubts About DNA Tests: Va. Judge Rejects Results, Questions Lab Work in Case of D.C. Hair Salon Owner*. WASHINGTON POST, August 21, 2005; C01.

7. See, David Chanen, *Defense attorneys raise concerns about DNA sample mix-up*. MINNEAPOLIS STAR-TRIBUNE, May 20, 2005; BCA crime lab under the microscope, KSTP-TV News (at www.kstp.com/article/stories/S8367.html?cat=1).

8. Letter from Jerry Richardson, Crime Laboratory Director, NC State Bureau of Investigation to Ralph Keaton, Director of ASCLD/LAB, May 23, 2005 (“During the course of the analysis the analyst extracted DNA standards from the suspect and victim and switched the samples...which led the analyst to conclude incorrectly that the suspect was the source of blood found at the crime scene”)(letter on file with the author).

9. William C. Thompson, et al. *How the probability of a false positive affects the value of forensic DNA evidence*. 48 J.FORENSIC SCI. 47 (2003)(discussing false incrimination of rape suspects in Philadelphia, San Diego, and Tulsa).

10. Glen Puit, *DNA evidence: Officials admit error, dismiss case* (LV lab put wrong name on sample). LAS VEGAS REVIEW JOURNAL, April 18, 2002.

11. See text preceding note 27, *infra*.

12. Roma Khanna, *Retesting of crime lab work in question*. HOUSTON CHRONICLE, Dec 6, 2004.

13. A “cold hit” occurs when a DNA profile found in an evidentiary sample in a case with no obvious suspects is found to match a DNA profile in a government database, such as a database of convicted offenders or a database of samples from other unsolved crimes.

14. See, U.S. Department of Justice, Office of the Inspector General, The FBI DNA Laboratory: A Review of Protocol and Practice Vulnerabilities, May 2004. Available online at: <http://www.usdoj.gov/oig/special/0405/index.htm>

15. Laura Cadiz, *Md.-based DNA lab fires analyst over falsified tests*, BALTIMORE SUN, Nov. 18, 2004.

16. Author’s interview with Robert

Shaler, former Director of the OCME DNA Laboratory.

17. Associated Press, *Worker in Army lab may have falsified DNA test result*. Aug. 27, 2005; Memorandum For All Staff Judge Advocates Re: Brady Notice by Lisa Kreeger, Staff Attorney, Department of the Army, October 17, 2005 (on file with the author).

18. See, Michael Bromwich, *Third report of the independent investigator for the Houston Police Department Crime Laboratory and Property Room*. Available online at: www.hpdlabinvestigation.org/.

19. DNA Advisory Board Quality Assurance Standards for Forensic DNA Testing Laboratories, Standard 14.1.1. Available online at: www.cstl.nist.gov/div831/strbase/dabqas.htm.

20. In a recent case in Washington, D.C. involving an allegedly inaccurate DNA paternity test, evidence showed that LabCorp, which conducts over 100,000 paternity tests a year, “has only five people reviewing the data and making paternity determinations — with one supervisor testifying that he issues an average of one paternity report every four minutes during a 10-hour shift.” Tom Jackman, *Paternity Suit Raises Doubts About DNA Tests: Va. Judge Rejects Results, Questions Lab Work in Case of D.C. Hair Salon Owner*. WASHINGTON POST, Sunday, August 21, 2005; C01

21. Letter from Jerry Richardson, *supra* note 8.

22. U.S. Department of Justice, Office of the Inspector General, The FBI DNA Laboratory: Review of Protocol and Practice Vulnerabilities, May 2004. Available on-line at: <http://www.usdoj.gov/oig/special/0405/final.pdf>.

23. Letter from Robin Cotton, Director, Technical Forensic Science, Orchid-Cellmark to Ralph Keaton, Executive Director, ASCLD/LAB, dated Sept 20, 2004 (on file with the author).

24. Simon Ford, Fraud detection through case reviews. Presentation at Forensic Bioinformatics 4th Annual Conference: The Science of DNA Profiling: A National Expert Forum, Dayton, Ohio, Aug. 13, 2005 (Available on-line at: http://www.bioforensics.com/conference05/FBS_Dayton_2005_Fraud.pdf)

25. *Id.*

26. Letter from Lt. Colonel Timothy J. Yungfer, Deputy Director, State Services Bureau, Michigan State Police to Stuart Dunning, President, Prosecuting Attorneys Association of Michigan, May 12, 2005 (on file with the author).

27. For an account of the false cold hit, and other DNA testing errors in New Zealand, see Michael Strutt, *Legally scientific? A brief history of DNA evidence in the criminal justice system*. June 9, 2001 (available on-

line at: http://www.justiceaction.org.au/actNow/Campaigns/DNA/pdf_files/02_Legal.pdf

28. See, William C. Thompson, Report to the Victoria State Coroner Regarding the Death of Jaidyn Leskie, December 3, 2003; William C. Thompson, Supplemental Report to the Victoria State Coroner, Jan 29, 2004; Dan Krane, Report: Victoria State Coroner's Inquest into the Death of Jaidyn Leskie, December 4, 2003. These reports are available online at: www.scientific.org.

29. Maryanne George, *Murder case mystery deepens*. DETROIT FREE PRESS, Jan 15, 2005.

30. According to news accounts, Hiller offered no evidence to support this theory. Liz Cobbs, *Judge raises possibility evidence may have been contaminated at State Police lab*, ANN ARBOR NEWS, May 11, 2005.

31. Author's interview with Professor Dan Krane (a defense expert in the case). Also, Thersa Mask, *Mixer's dad is clear on one thing*, DETROIT FREE PRESS, July 13, 2005.

32. Documents in any digital format can be uploaded to the library from any computer with access to the web. As you upload each document, you can fill out a convenient digital form explaining what the document is and why it is important (e.g., "This is a transcript in which analyst from Lab X admits to accidentally switching samples during DNA testing" or "This is a corrective action file from

Lab Y"). If you have only a hard copy of a document, and are not able to scan it, you can fax it to (202) 824-2929. Once uploaded, documents are reviewed by the staff of the Forensics Library, and then posted. There are three possible levels of access to documents in the Library. Documents can be made available to anyone who comes to the website, or available only to those who attest that they are defense lawyers, or available only on a need to know basis to people approved by the Library staff.

33. Christina Nuckols, *Governor appoints panel to oversee Va's crime lab*. VIRGINIAN-PILOT, August 9, 2005.

34. National Research Council, *DNA Technology in Forensic Science* (1992).

35. Joseph L. Peterson, George Lim, Monica Ho, Yingyu Chen & R.E. Gaensslen, *The Feasibility of External Blind DNA Proficiency Testing I, Background and Findings*. 48 J.FORENSIC SCI. 1 (2003); Joseph L. Peterson, George Lim, Monica Ho, Yingyu Chen & R.E. Gaensslen, *The Feasibility of External Blind DNA Proficiency Testing II, Experience with Actual Blind Tests*. 48 J.FORENSIC SCI. 1 (2003).

36. The author of this article was a member of that advisory panel, which consisted primarily of forensic scientists, and cast the sole vote in favor of recommending a program of external blind proficiency tests.

37. Michael J. Saks & Jonathan J.

Koehler, *The coming paradigm shift in forensic identification science*. 309 SCIENCE 892 (Aug 5, 2005).

38. There is a solid scientific basis for characterizing and estimating the frequency of matching DNA profiles that simply does not exist for matching fingerprints, bitemarks, toolmarks, etc. ■

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