No. 10-8505

IN THE

Supreme Court of the United States

SANDY WILLIAMS,
Petitioner,

v.

PEOPLE OF THE STATE OF ILLINOIS,
Respondent.

On Writ of Certiorari to the Supreme Court of Illinois

BRIEF OF *AMICI CURIAE* PUBLIC DEFENDER SERVICE FOR THE DISTRICT OF COLUMBIA AND NATIONAL ASSOCIATION OF CRIMINAL DEFENSE LAWYERS IN SUPPORT OF PETITIONER

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INTEREST OF *AMICI* [1]

Amicus Curiae Public Defender Service for the District of Columbia (PDS) represents indigent criminal defendants in the District of Columbia. *Amicus Curiae* the National Association of Criminal Defense Lawyers (NACDL) is a non-profit corporation with a membership of more than 10,000 attorneys nationwide, along with 78 state and local affiliate organizations in 50 states.

Attorneys employed by or affiliated with *amici* regularly represent clients where the prosecution seeks to use a perpetrator's DNA profile that has been developed from an evidentiary sample as inculpatory evidence. Agreement or a match between a perpetrator profile and a defendant's known profile may be decisive in a case; indeed it may be the only link between the defendant and the charged crime. In *amici's* view, it is critical to the truth-seeking function of a trial to allow the defendant to confront not only the prosecution expert who declares a match between the reported perpetrator profile and the defendant's known profile, but also the lab analyst who actually developed the perpetrator profile.[2]

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[1] Both parties have filed letters with the Court consenting to the filing of amicus curiae briefs in support of either or neither party. No counsel for any party authored any part of this brief, and no person or entity, other than *amici*, has made a monetary contribution to the preparation or submission of this brief.

[2] Throughout this brief *amici* use the term "lab analyst" to refer to the person who does the casework to isolate biologic material recovered in a criminal investigation and to develop a DNA profile of a perpetrator therefrom. *Amici* use the term "prosecution expert" to refer to any person who compares an already-developed perpetrator profile to a known profile of a suspect and draws conclusions based on that comparison (*e.g.*,

SUMMARY OF ARGUMENT

Petitioner has explained why the Confrontation Clause was violated when the prosecution presented testimonial evidence essential to its case – a deduced perpetrator profile – through expert testimony, where the expert had not conducted or observed any of the lab work conveyed in that testimonial evidence. *Amici* write to explain why the Court should care.

There are several reasons why it would not be an "empty formalism" to reaffirm a defendant's right to confront a lab analyst who knows how the DNA typing conveyed to the fact-finder was actually done. First, forensic DNA typing is a complicated process that requires a number of steps involving both skill and judgment. Second and relatedly, DNA analysts are not infallible. They make mistakes. They contaminate samples. They sometimes even commit fraud. Third, the defendant's opportunity to confront the prosecution expert by no means obviates confrontation of the lab analyst. With only the prosecution expert as a testifying witness, the defendant cannot probe (1) who the lab analyst is; (2) how, according to protocol, she should have developed the perpetrator profile; or (3) what actually happened in the course of the DNA typing. In short, confrontation of the lab analyst who deduces a perpetrator profile is essential to the truth-seeking function of a criminal trial in which the prosecution seeks to incriminate a defendant using DNA evidence.

There is no substitute mechanism to guarantee the reliability and validity of this evidence. In particular,

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that a suspect cannot be excluded as the contributor of DNA from a particular item of evidence, or the likelihood that a randomly selected person similarly would not be excluded).

the Court should not be swayed to exempt from confrontation lab analysts who do forensic DNA typing simply because the laboratories that employ them are accredited. Accreditation is a potentially valuable oversight tool, but the accreditation system for forensic labs in the United States has its own deficiencies, and it has not prevented errors in individual cases.

ARGUMENT

I. CONFRONTATION OF THE DNA LAB ANALYST WHO DEVELOPED A PERPETRATOR PROFILE FROM AN EVIDENTIARY SAMPLE WOULD NOT BE AN EMPTY FORMALISM.

This Court has made clear that a defendant has the right to confront the declarant of a testimonial statement regardless of any assurances of the reliability of proffered scientific information or the opportunity to cross-examine a surrogate witness. *Bullcoming v. New Mexico*, 131 S. Ct. 2705, 2715-16 (2011); *Melendez-Diaz v. Massachusetts*, 129 S. Ct. 2527, 2536 (2009). *Amici* can nonetheless reassure the Court that confrontation of a lab analyst who developed and reported a perpetrator DNA profile would not be an "empty formalism," either because her testimonial statement concerned DNA, or because the prosecution presented an expert to testify about a match to the defendant. *Id.* at 2537 n.6. An overview of what a lab analyst must do to develop and report out a perpetrator profile makes this clear.

A. Developing a DNA profile of a perpetrator from biologic evidence collected in a criminal investigation is a complicated process that requires a number of steps involving skill and judgment.

A lab analyst must take a number of steps to transform a mixture of biologic material collected in a criminal investigation into a DNA profile that can be used as the basis for identifying a perpetrator. A lab analyst begins the process by breaking the recovered cells open and extracting the genetic material from the nuclei.[3] John M. Butler, *Fundamentals of Forensic DNA Typing*, 7, 99-108 (2010) [hereinafter *Fundamentals of Forensic DNA Typing*].[4] Where, as here, an evidentiary sample submitted to the lab may contain both sperm and non-sperm (or epithelial) cells, an analyst will attempt at the extraction stage

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[3] A number of types of forensic DNA analysis have been developed (*e.g.*, Y-STR testing, which involves analyzing segments of DNA on the Y chromosome, and mtDNA testing, which involves examining DNA from the mitochondria, cellular bodies found outside the nucleus), and within each of these broad categories, a variety of methodologies have arisen that seek to exploit certain properties of our genetic material, with newer and better methods always on the horizon. *Amici* describe here only the type of DNA testing apparently performed in this case – the creation a 13-locus profile of nuclear DNA.

[4] *Amici* rely heavily on Dr. Butler's "canonical text," *District Attorney's Office for Third Judicial Dist. v. Osborne*, 129 S. Ct. 2308, 2327 (2009) (Alito, J., concurring) (quoting Erin Murphy, *The Art in the Science of DNA: A Layperson's Guide to the Subjectivity Inherent in Forensic DNA Typing*, 58 Emory L.J. 489, 493 n. 16 (2008)). Dr. Butler's text has now been divided into two volumes, *Fundamentals of Forensic DNA Typing*, and the forthcoming *Advanced Topics in Forensic DNA Typing*. *Fundamentals of Forensic DNA Typing*, at ix.

to separate this biologic material into different test tubes in hopes of separating the male and female DNA. *Id.* at 105-06. But the analyst's efforts, called "differential extraction," may not be completely successful, resulting in a mixture of DNA contributed by (at least) two people, the victim and her assailant. *Id.* Even a successful differential extraction can result in a mixture of DNA if sperm or epithelial cells from more than one person are present. When there are mixtures of DNA, it may not be "clear whose profile is whose, or even how many profiles are in the sample at all." Murphy, 58 Emory L.J. at 497; *see* pp. 9-10 *infra*.

After the DNA is extracted, it is quantified. *Fundamentals of Forensic DNA Typing* at 111-21. A lab analyst uses the quantitation information to determine whether the DNA sample needs to be concentrated or diluted. *Id.* Bringing the DNA to the proper concentration is an inexact procedure that may require more than one attempt, but is critical for the next step of DNA typing – amplification. *Id.* at 111-12, 117, 121.

"DNA from crime scenes is often limited in both quantity and quality," and typically, there is too little good quality DNA to analyze without additional processing. *Id.* at 125; *see also id.* at 315. Thus, before the analyst can develop a perpetrator profile, she must copy or "amplify" the often minute amounts of extracted DNA. *Id.* at 125.

An analyst amplifies the DNA sample using a technique called Polymerase Chain Reaction, or PCR. *Id.* at 125-42. Using one of a number of commercial kits available, an analyst only copies distinctive fragments of the DNA molecule; these are composed of repeating patterns called Short Tandem Repeats or

STRs. *Id.* at 147-68. Standard forensic practice is to copy 13 STR locations (or loci) along with an indicator of sex. *Id.* at 154-57, 166.[5] Once the DNA at each locus is copied and detected (*see infra*), its size is used to deduce the number of repeats present and corresponding numeric values, called alleles, are assigned. *Id.* at 152-54, 205, 207-11, 214. Since genetic material is obtained from each parent, humans typically have two allele types at each of the observed loci. *Id.* at 25

Amplification by PCR is often described as "xeroxing" DNA. *Id.* at 125-26. But xeroxing is too simple an analogy, because the copying process by PCR is not perfect. PCR splits apart the strands of the DNA molecule and allows separated strands to join with materials that the analyst has added into the mix. *Id.* at 126. This creates duplicate strands of DNA at the targeted locations that are then again split apart and copied in the same manner. The separation and replication of DNA is achieved using a thermal cycler which runs the DNA through a cycle of heating and cooling for specific times at specific temperatures. *Id.* at 126, 131-33. This is typically done 28-32 times. *Id.* at 126.

A number of things may muddle the results of amplification. If the separated strands of DNA do

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[5] These are the loci the FBI includes in its Combined DNA Index System (CODIS) and are commonly known as the "core CODIS loci." Federal Bureau of Investigation, *Frequently Asked Questions (FAQs) on the CODIS Program and the National DNA Index System*, available at http://www.fbi.gov/about-us/lab/codis/codis-and-ndis-fact-sheet (last visited Sept. 1, 2011). With technological advances some labs now regularly test 15 loci plus the sex locus on the DNA molecule. *Fundamentals of Forensic DNA Typing* at 158.

not marry up properly with the added materials, incomplete copies of DNA will result and may make it more difficult for the analyst to discern an accurate profile. *Fundamentals of Forensic DNA Typing* at 133-36, 151, 218; *see also* John M. Butler, *Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers* 123-26 (2d. ed. 2005). Also, if the extracted DNA fails to copy sufficiently, it may produce unsatisfactory results or no results at all at the later detection stage. *Fundamentals of Forensic DNA Typing* at 131, 140, 216, 315-17. The analyst may opt to "reamp" it at different settings of her choosing. *Id.* at 131, 330-31, 333. But in so doing she may also reamp any contaminants (a serious concern in DNA typing[6]), thereby introducing results that deceptively appear to be part of the DNA profile from the evidence sample. *Id.* at 331-33. Or she may lose DNA fragments that are legitimately associated with the evidence sample but fail to replicate and "drop out" of the amplified product. *Id.* at 222-23, 331-33. This is particularly a problem with low-copy DNA typing – where analysts use modifications to standard DNA typing protocols to attempt to coax results from low quantity DNA that otherwise would produce minimal or no results. *Id.* at 330-34.[7]

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[6] *Fundamentals of Forensic DNA Typing* at 101, 141-42, 333; *see also Osborne*, 129 S. Ct. at 2327-28 (Alito, J., concurring) (observing that "modern DNA testing technology is so powerful that it actually increases the risks associated with mishandling evidence" because "[a]ny test that is sensitive enough to pick up . . . trace amounts of DNA will be able to detect even the slightest, unintentional mishandling of evidence").

[7] There is currently no technique generally accepted as reliable to perform Low Copy Number (LCN) typing. Accordingly, some forensic DNA labs (such as the District of Columbia's) do not attempt it. Others do, however, each employing their own

The final step in processing the DNA sample is to attempt to detect the DNA. A lab analyst runs the amplified mixture through a capillary electrophoresis instrument, which separates and measures the copies of the sex locus and STRs at the 13 CODIS loci. *Id.* at 175-76, 180-200. The lab analyst then runs the data from the capillary electrophoresis through a software program. *Id.* at 183, 186-200, 206, 211-13. The program generates "a kind of graph with peaks and valleys," called an electropherogram. Murphy, 58 Emory L.J. at 498; William C. Thompson, et al., *Evaluating Forensic DNA Evidence, Part 1: Essential Elements of a Competent Defense Review*, The Champion 16, 18-24 (April 2003) [hereinafter *Evaluating Forensic DNA Evidence, Part 1*] (Figures 2-9, displaying examples). Using threshold measures set by the lab or the individual analyst, the program labels some peaks and disregards others. *Evaluating Forensic DNA Evidence, Part 1* at 24-25; *Fundamentals of Forensic DNA Typing* at 206, 213.

Looking at the electropherogram, a lab analyst conducts another level of review and decides, based on a combination of calculations and subjective assumptions, which peaks represent real alleles and which can be disregarded. *Fundamentals of Forensic DNA Typing* at 206-7, 216-24; *Evaluating Forensic DNA*

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methods. LCN typing has been criticized as producing potentially unreliable results by leading DNA researchers in the law enforcement community, including Bruce Budowle, the former head of the FBI's forensic DNA lab. *See, e.g.*, Bruce Budowle, *Low Copy Number Typing Still Lacks Robustness and Reliability* (2010), available at http://www.promega.com/resources/articles/profiles-in-dna/low-copy-number-typing-still-lacks-robustness-and-reliability/ (last visited Sept. 1, 2011). As labs try to get results from smaller and smaller DNA samples, LCN typing is the next frontier in developing forensic DNA evidence.

Evidence, Part 1 at 21-25. Some peaks are random products of the instrument. They are not reproducible, and the lab analyst always has the option of running the DNA sample through the capillary electrophoresis again to see if they will go away. *Fundamentals of Forensic DNA Typing* at 219-20; *Evaluating Forensic DNA Evidence, Part 1* at 24. Some peaks may be the product of imperfect amplification or contamination of the sample at some point in the testing process. *Fundamentals of Forensic DNA Typing* at 218; *Evaluating Forensic DNA Evidence, Part 1* at 22-23. Because forensic DNA labs anticipate some level of contamination, they run "negative controls" – test tubes to which they add reagents alongside evidence samples throughout the DNA typing process – to attempt to detect extraneous DNA from the environment that may have been introduced into the typing process. *Fundamentals of Forensic DNA Typing* at 130, 301. Labs also run "positive controls" – samples of DNA for which the profile is known – to ensure that the DNA typing process is working properly. *Id.* at 131, 301. The electropherograms of the positive and negative controls may inform a lab analyst's interpretation of the electropherogram of the DNA in the evidentiary sample.

In her review of the electropherogram, a lab analyst not only decides which alleles are real, but also, in a case where she observes what she believes to be more than two alleles at any one locus, she attempts to discern which alleles belong to the perpetrator and which belong to the complaining witness or someone else. *Id.* at 320-27; *Evaluating Forensic DNA Evidence, Part* 1 at 21; Murphy, 58 Emory L.J. at 499-508 (detailing "the Subjectivity Inherent in Forensic DNA Typing"). Based on her judgment calls, the

analyst develops an allele chart with numbers for each extracted, amplified DNA sample. *Evaluating Forensic DNA Evidence, Part 1* at 17 (displaying and discussing an example).[8]

As detailed above, current methods of DNA typing are complex, sensitive, and have their limitations. Even forensic DNA typing done perfectly may not give a clear result, particularly in cases where the evidentiary sample tested by a lab contains a mixture of DNA from two or more people (as in Mr. Williams' case) or only a very small amount of DNA ("low-copy"), or is degraded (or degrades in the testing process), or where newer methods of DNA testing are used (*e.g.*, Y-STR or mtDNA). Furthermore, the results of DNA typing may be subject to interpretation – interpretation that may be influenced by what transpired during the DNA typing process.

B. DNA lab analysts are not infallible.

Even in the context of DNA testing, "there is little reason to believe that confrontation will be useless in testing analysts' honesty, proficiency, and methodology – the features that are commonly the focus in the

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[8] In this case, the lab analyst apparently went through the process described above to develop allele charts for the sperm sample and the epithelial sample taken from the vaginal swab, and an allele chart for the complainant's known sample. Joint Appendix (JA) 69. Then because she was not able to clearly discern two alleles at each locus in the sperm sample that belonged to the perpetrator, the lab analyst took one additional step and deduced an allele chart for the perpetrator. JA 65, 78. The prosecution expert did not know how the lab analyst had deduced the perpetrator profile, but she surmised that the analyst had subtracted out the allelic values in the chart she created for the complaining witness from the allelic values in the chart she had created for the sperm sample. JA 77.

cross-examination of experts." *Melendez-Diaz*, 129 S. Ct. at 2538. To the contrary, DNA evidence "is still subject to errors in handling that can invalidate the analysis." Nat'l Research Council, *Strengthening Forensic Science in the United States: A Path Forward* 133 (Nat'l Acad. Press ed. 2009) (hereinafter NAS Report); *see also id.* at 132 (acknowledging errors "usually involve situations in which interpretational ambiguities occur or in which samples were inappropriately processed and/or contaminated"); *Osborne*, 129 S. Ct. at 2327 (Alito, J., concurring) ("STR analyses are plagued by issues of suboptimal samples, equipment malfunctions and human error") (internal quotation and citation omitted).

Amici estimate that there are currently 200 federal, state, county, municipal, and private for-profit labs that do forensic DNA typing in the United States.[9] The reality is that some labs are better than others. William C. Thompson, *Tarnish on the "Gold Standard": Understanding Recent Problems in Forensic DNA Testing*, The Champion 10, 10-12 (Jan./Feb. 2006) (hereinafter *Tarnish on the "Gold Standard"*). Among other things, they have different staff, different training requirements and programs, different levels of funding, and different standard operating procedures. *See generally* NAS Report at 14. In addition, they "vary greatly in the care with

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[9] *See* Census of Publicly Funded Forensic Crime Laboratories (2005) (http://bjs.ojp.usdoj.gov/content/pub/pdf/cpffcl05.pdf) (last visited Sept. 1, 2011) (in survey of 389 publicly funded forensic crime laboratories, 351 responded, and 53% (186) said that they do DNA testing); NAS Report at 41 ("more than 175 publicly funded forensic laboratories and approximately 30 private laboratories conduct . . . DNA analyses . . . in the United States").

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." *Tarnish on the "Gold Standard,"* at 11. Professors Thompson and Krane explain:

> A forensic laboratory may fail to notice or choose not to report . . . a failure of experimental controls, multiple testing of samples with inconsistent results, re-labeling of samples (which can flag potential sample mix-ups or uncertainty about which sample is which), and failure to follow proper procedures . . . [*e.g.*,] that the laboratory failed to run all of the necessary control samples needed to verify the reliability of the test results, or that the laboratory ran the control samples under different conditions than the analytical samples (a major breach of good scientific practice).

William Thompson and Dan Krane, Chapter 11: DNA in the Courtroom, *Psychological and Scientific Evidence in Criminal Trials* § 11:27 (2003); *see also* William C. Thompson, et al., *Evaluating Forensic DNA Evidence. Part 2*, The Champion 24 (May 2003).

The range of quality notwithstanding, "[l]aboratory errors happen, even in the best laboratories and even when the analyst is certain that every precaution against error was taken." Nat'l Research Council, *DNA Technology in Forensic Science*, 89 (Nat'l Acad. Press ed. 1992) (hereinafter NRC I). The attached appendix contains a collection of documented lab mistakes and misconduct from the last 16 years in both public and private labs. Appendix A. These mistakes and misconduct were neither prevented by the labs' internal quality assurance mechanisms nor

detected by the labs' internal quality control measures. The entries are not limited to bad labs; even "flagship" DNA labs are represented. *Id.* (No. 11). Cellmark's Germantown Maryland lab is listed twice. *Id.* (Nos. 7, 19). Systemic problems include contamination of DNA samples,[10] *id.* (Nos. 1, 3, 4, 6, 7, 8, 13, 15); human error, in particular, sample switching and mislabeling, *id.* (Nos. 4, 5, 7, 13, 14, 16, 17, 18, 20); fraud – such as "dry labbing," faking tests or controls, and tampering with records of controls, *id.* (Nos. 4, 9, 11, 13); and cheating on competency tests. *Id.* (Nos. 2, 10, 12).

Amici's aim is not to impugn forensic DNA typing, which has rightly been held up as a model to which other methods of forensic identification should aspire, but merely to highlight that "some risk of error is inevitable" in DNA typing, "as in any human endeavor." Nat'l Research Council, *The Evaluation of Forensic DNA Evidence*, 75 (Nat'l Acad. Press ed. 1996) (hereinafter NRC II); *see also* Erin Murphy, *What 'Strengthening Forensic Science' Today Means for Tomorrow: DNA Exceptionalism and the 2009*

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[10] Good labs require documentation of instances of contamination. The surprise for the nonscientist may be "how voluminous the[se files] are." *Tarnish on the "Gold Standard,"* at 11. But "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'" in these labs. *Id.* at 12. Rather like the canary in the mine, contaminated controls are often evidence of "sloppy laboratory technique," that may undermine the reliability of other tests. *Id.* "If DNA from a suspect is accidentally transferred into a 'blank' control sample, it is obvious 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." *Id.*

NAS Report, 9 Law, Probability & Risk 7, 19-20 (April 2010) (warning of DNA "exceptionalism" and noting that while DNA typing is superior to the "first-generation" of forensic evidence, "it is [still] subject to the same biases, shortcomings, errors and slow evolutionary advance as any other technique" and thus it "too[ ] requires ongoing scrutiny").

C. Making the prosecution expert who declares a match available for cross-examination does not obviate cross-examination of the lab analyst who developed the perpetrator profile.

Any criminal defendant inculpated by evidence of a match (or agreement) between a reported perpetrator profile and his known profile, may want to confront the lab analyst to probe three issues: (1) who the analyst is; (2) how, according to protocol, she should have developed the perpetrator profile; and (3) what actually happened in the course of the DNA typing. But the prosecution expert, whose only source of knowledge about the creation of a perpetrator's DNA profile is what she has read in a report generated by the lab analyst, cannot speak to any of these issues.

1. *The defense cannot use cross-examination of the prosecution expert to challenge who the lab analyst is.*

It has long been recognized that confrontation is valuable because it affords the defense and the trier-of-fact a first-hand "opportunity [to] observ[e] the quality, age, education, understanding, behavior, and inclinations of th[ose] witness[es]; in which points all persons must appear alike, when their depositions are reduced to writing." Sir William Blackstone, 3 *Commentaries on the Laws of England* *374 (1765-69

ed.). But where, as here, a prosecution expert is allowed to testify about the results of DNA typing generated by another lab, the identity of the lab analyst who performed the requisite steps to create the profile is hidden. Even if the defense has a name on a lab report turned over in discovery, the defense (and the fact-finder) cannot see or probe who that person is and cannot assess if that person has the requisite training or skills to do the work she did, the experience to exercise discretion when discretion was called for in the typing process, or a history of making mistakes.[11] *Melendez-Diaz*, 129 S. Ct. at 2537 ("an analyst's lack of proper training or deficiency in judgment may be disclosed in cross-examination"); *see also Bullcoming*, 131 S. Ct. at 2715 (cross-examination of surrogate witness did not satisfy Confrontation Clause because defendant could not ascertain from the surrogate why the analyst had been placed on unpaid leave). And of course the opportunity to confront the prosecution expert does not afford the analyst "the prospect of confrontation," which "will deter fraudulent analysis in the first place." *Melendez-Diaz*, 129 S. Ct. at 2537.

Apart from qualifications and prior mistakes, the defense cannot probe the lab analyst's bias. As this Court has acknowledged,

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[11] The state asked the expert witness who testified in Mr. Williams' case a number of questions to elicit her *bona fides*. JA 44-47. This polished expert received rave reviews from the trial court, *People v. Williams*, 939 N.E.2d 268, 276 (Il. 2010) (declaring her "the best DNA expert I have ever heard"), but there is no reason to believe the expert's professional experience or performance on the stand would be representative of a DNA lab analyst, particularly if the lab believed the analyst could be shielded from being called as a prosecution witness.

> [b]ecause forensic scientists often are driven in their work by a need to answer a particular question related to the issues of a particular case, they sometimes face pressure to sacrifice appropriate methodology for the sake of expediency . . . . A forensic analyst responding to a request from a law enforcement official may feel pressure – or have an incentive – to alter the evidence in a manner favorable to the prosecution.

Melendez-Diaz, 129 S. Ct. at 2536 (internal quotation and citation omitted). Laboratories that do forensic DNA testing routinely communicate with law enforcement and the prosecution for the entirely legitimate purpose of facilitating their testing. But the information transmitted in these interactions may go beyond what is needed for effective testing. And if the lab does not take sufficient precautions to screen its analysts from irrelevant (for the lab's purposes) but prejudicial information, it may compromise the lab analyst's neutrality as a technician or scientist. *See, e.g.*, *Evaluating DNA in the Courtroom, Part 1* at 18-19. Beyond classic bias against the defendant, the defense cannot ask the analyst whether there is any pressure in the lab to perform more quickly, potentially at the cost of being careful and thorough. This may be a particular concern where the analyst works for a for-profit private lab.

Finally, the defense cannot probe the lab analyst's honesty through the expert witness. *Amici* have no reason to believe that DNA analysts are any more honest than the general population. *See Osborne*, 129 S. Ct. at 2328 (Alito, J., concurring) (noting "the intentional DNA-evidence-tampering scandals that have surfaced in recent years."); Appendix A (Nos. 2,

4, 7, 10-13); *see also Tarnish on the "Gold Standard"* at 12 (discussing the pressures that might induce a lab analyst to commit fraud). Prior bad acts and the possibility of falsifying records or tampering with evidence in the instant case are all potentially legitimate areas of inquiry that defense counsel should be able to pursue on cross-examination, but cannot when only an expert witness testifies. *See* JA 83 (sustaining objection to defense counsel's question whether expert was "aware of any instances of . . . fraud by analysts at Cellmark").

2. *The defense cannot use cross-examination of the prosecution expert to probe or challenge the standard operating procedures and quality assurance mechanisms at the analyst's lab – or the analyst's knowledge or understanding of those requirements.*

In 2011, all labs that conduct forensic DNA typing should have written standard operating procedures ("SOPs"). *See* NRC I at 51-56, 104-05 (recommending that forensic DNA labs create and validate SOPs). These SOPs generally tell lab analysts what tests to do in what circumstances, how to do those tests, and what quality control methods to follow (*e.g.*, what controls to run to make sure the reagents function and tested material and reagents are not contaminated). These SOPs should be validated by the lab to ensure that they produce repeatable, reliable results. *Fundamentals of Forensic DNA Typing* at 8-9, 300-03; *see also* NRC I at 51-52, 55, 72, 104-05; NRC II at 76. Forensic DNA labs should also have a quality assurance document or manual that addresses, *inter alia*, who is allowed to do what in the lab, how the lab should be set up, how evidence should be labeled,

stored and handled, how reagents should be stored, how equipment should be maintained, and how casework and problems in the lab – *e.g.*, instances of contamination – should be documented. *See* NRC I at 16, 105; NRC II at 76, 80-85. A lab's SOPs and quality assurance documents should be revised to address new testing methods or when a concern arises about the operation of the lab and reliability and repeatability of its tests. A lab's work is only as good as its SOPs.

Among the approximately 200 labs in the U.S. that do forensic DNA typing, SOPs and quality assurance materials vary in substance, length and specificity, and they afford an analyst varying levels of discretion in how to do her job. *See, e.g.*, JA 60 (prosecution expert acknowledges that she is aware Cellmark and the Illinois State Police have different procedures and standards for reporting results). Where, as here, the lab analyst does not testify and the prosecution expert comes from a different lab and has no knowledge of the relevant policies and procedures and quality assurance and quality control mechanisms, the defense cannot probe what those requirements are. Thus, although the prosecution expert represented that Cellmark "would have to meet certain guidelines to perform DNA analysis . . . so all those calibrations and internal proficiencies and controls would have had to have been in place," JA 59-60, she did not "review their [Cellmark's] procedures." JA 60.[12] Due

[12] The Illinois Supreme Court seemed to think the prosecution expert had something to do with establishing "guidelines" for Cellmark's Germantown lab, 939 N.E.2d at 276 (noting "Cellmark was an accredited laboratory and followed guidelines that she [the expert] had personally developed"). But the expert testified only that she had "helped develop" at some unspecified point in time a "line of proficiency tests to be administered to

to the expert's admitted ignorance, defense counsel was precluded from exploring precisely what Cellmark's SOPs required, how they might have been deficient or left room for error, confusion, or contamination, or how they might have required an action that was not taken in this case (*see* I.B.3 *infra*).

3. *The defense cannot use cross-examination of the prosecution expert to probe or challenge what the lab analyst actually did, what actually happened during the DNA typing process, or why the analyst reported out the profile the way she did.*

Obviously, when only a prosecution expert testifies, the defense cannot probe and challenge what the lab analyst actually did or what actually happened during the extraction, quantitation, dilution, and amplification of the DNA or the injection of this mixture into the capillary electrophoresis for separation and detection. In Mr. Williams' case, the prosecution expert briefly explained "how PCR DNA testing is done" generally, JA 48, but she did not know how it was conducted by Cellmark, and she acknowledged that she "did not observe anything." JA 60; *see also* JA 59 (acknowledging she "based . . . [her] testimony on testing that was done by that other lab"). Indeed, defense counsel was prevented from asking the prosecution expert "if the results in . . . [Cellmark's sperm sample] data were wrong, would any matches be

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analysts at Cellmark." JA 87. The expert never stated whether the tests had actually been used, and, in any event, proficiency tests – tests to determine if individual analysts can perform a specific task competently, *Fundamentals of Forensic DNA Typing* at 297-300 – are not the same thing as standard operating procedures or "guidelines" for a lab's operations.

wrong?" because the question called for "[s]peculation with no basis of fact." JA 69-70.

As this case demonstrates, defense counsel cannot probe through the prosecution expert whether the lab analyst actually followed the protocols that are essential to the validity of the results. Even assuming compliance, defense counsel cannot probe through the prosecution expert the discretionary calls made by the lab analyst throughout the DNA typing process, *e.g.*, whether to "reamp" the extract with any adjustments for concentration or otherwise. *See* p. 7 *supra*; JA 82 (expert admits she did not know anything about the quantitation of the DNA in this case). Moreover, if any of the requisite steps for DNA typing was redone (pursuant to protocol), defense counsel cannot probe through the prosecution expert why it was redone and whether inconsistent results were obtained. And defense counsel cannot probe through the prosecution expert whether any notable or unexpected events took place, *e.g.*, whether any of the controls registered problems with the typing process. JA 62 (expert acknowledges that she did not review the electropherograms for the positive or negative controls).

Likewise, defense counsel cannot probe through the prosecution expert why the lab analyst reported the perpetrator profile the way she did. The lab analyst in this case was apparently unable to discern a pure profile for the perpetrator. She observed more than two allelic values at multiple loci, JA 71 – but then determined that some of these values could be disregarded in the sperm sample profile and some could not. JA 77-79. The judgment calls the lab analyst made to produce the deduced perpetrator profile are unquestionably something that defense

counsel would have liked to cross-examine the lab analyst about and highlights why confrontation of the lab analyst was critical in this case.[13]

* * *

For all of these reasons, confrontation of a lab analyst who deduces a perpetrator's DNA profile is essential to the truth-seeking function of a criminal trial in which the prosecution seeks to incriminate a defendant using DNA evidence.

II. THE COURT SHOULD NOT EXEMPT A DNA LAB ANALYST FROM CONFRONTATION BECAUSE SHE WORKS IN AN ACCREDITED LAB.

At trial the prosecution expert repeatedly asserted that Cellmark was an accredited lab. JA 49, 59-60,

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[13] These judgment calls were not moot because of the Illinois Supreme Court's assessment that the prosecution expert "conducted an independent evaluation of data." 939 N.E.2d at 276. The expert's review of the available data was quite cursory. She did not review any of the raw data from the capillary electrophoresis which was used to generate the electropherograms. JA 69. She did not review any of the negative or positive control data for the sperm sample. *Id.* at 62. She did not review the electropherograms of the epithelial sample or the complaining witness' standard, *id.* at 62, 68-69 – which the lab analyst would have used to create the allele charts that she then used to help her deduce the perpetrator profile. And the prosecution expert did not review the lab's protocols, which would have told her precisely how Cellmark should have done the DNA typing in this case. *Id.* at 60. Moreover, the data that the prosecution expert *did* review – the allele charts of the epithelial sample, the sperm sample, and complaining witness' known sample, *id.* at 61, 69, and the one electropherogram of the sperm sample, *id.* at 62, 68-69 – could not support an "independent" evaluation of the deduced perpetrator profile, since all of this information was developed and reported by the lab analyst.

74. The implication was that Cellmark must have done everything correctly in Mr. Williams' case because "all those calibrations and internal proficiencies and controls would have had to have been in place." *Id.* at 59-60. The illegitimacy of this reliability argument notwithstanding, *Crawford v. Washington*, 541 U.S. 36, 61 (2004) ("[a]dmitting statements deemed reliable by a judge is fundamentally at odds with the right of confrontation"), the argument that accreditation of a forensic laboratory is alone a sufficient guarantee of reliability of reported results in individual criminal cases bears rebutting.

Ensuring adherence to protocol and confirming the validity of test results in individual cases is not the object of accreditation. NAS Report at 195. The aim of accreditation is to promote lab-wide compliance with set standards. *Id.* To this end, accrediting bodies review minimum standards for protocols, quality assurance measures, and documentation of casework and problems. *See, e.g., ASCLD/LAB Inspection Report for San Francisco Police Department Criminalistics Laboratory*, Nov. 17-19, 2009.[14] Although some case work is audited, it is only a small sampling of the work done by the lab; not every case is scrutinized in the accreditation or reaccreditation process.

Accreditation of forensic labs has not prevented errors, contamination, and fraud in individual cases. NAS Report at 47-48 ("even accredited laboratories make mistakes"). A number of labs accredited by the American Society of Crime Laboratory Directors

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[14] Available at http://www.cacj.org/documents/SF_Crime_Lab/Documentation/2009_ASCLAD_Audit_Report_SF_Crime_Lab.pdf) (last visited Sept. 1, 2011).

Laboratory Accreditation Board (ASCLD/LAB), the primary accreditor of forensic labs in the United States,[15] have suffered from serious quality control and quality assurance issues that the accreditation and reaccreditation process did not catch.[16] In 13 out of the 20 examples of documented misconduct and mistakes in DNA typing discussed in Appendix A, the laboratories were accredited at the time of the misconduct or mistake. Appendix A (Nos. 1-4, 6-9, 11-12, 15-16, 19).

Many of these labs were accredited under weak standards that ASCLD/LAB created (subsequently dubbed the "Legacy Program"). ASCLD/LAB only adopted more rigorous international standards for accreditation (ISO 17025) in 2004.[17] And ASCLD/LAB has been slow in requiring labs to follow the international standard in lieu of its Legacy stan-

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[15] *See* Census of Publicly Funded Forensic Crime Laboratories (2005), n.9 *supra* (78% of 293 publicly funded forensic crime laboratories labs responding to survey question regarding accreditation said that they were accredited by ASCLD/LAB).

[16] There are also numerous examples of accredited lab failures outside the context of DNA testing. For example, North Carolina's State Bureau of Investigation was accredited by ASCLD/LAB, but that did not prevent the SBI from imploding last year after it was discovered that lab analysts withheld or misreported the results of blood tests in at least 230 cases, and maintained a bloodstain analysis unit that had no set guidelines. Mandy Locke and Joseph Neff, *Inspectors Missed All SBI Faults*, The News Observer, Aug. 26, 2010; Joseph Neff and Mandy Locke, *SBI Bloodstain Analysis Team Had No Guidelines for 21 Years*, The News Observer, Sept. 9, 2010).

[17] http://www.ascld-lab.org/about_us/history.html (last visited Sept. 1, 2011).

dards.[18] There are currently 96 forensic DNA labs accredited under ASCLD/LAB's Legacy Program. *See Amici* Appendix B.

Amici support a robust accreditation system for forensic labs. But although organizations like ASCLD/LAB have been steadily raising their standards, they are still evolving. Even if these accrediting bodies were operating with the independence and high standards *amici* believe are needed, this would not supplant the need for adversarial testing in an individual case. To the contrary,

> *effective forensic analysis requires quality assurances of numerous kinds*, including: that the methodology is valid (including tailored to a particular purpose); that the laboratory's protocols for executing the methodology are valid (including training, oversight, and error prevention); that the laboratory's actual execution of that protocol is generally reliable (including blind testing, quality assurance methods, and regular review of corrective action files); *and that the execution of a methodology in a particular case is reliable.*

Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 Cal. L. Rev. 721, 784 n. 272 (2007) (emphasis added); *see also* NRC II at 80 ("There is no single solution to the problem of error."). To ensure that the execution of DNA typing in a particular criminal case is reliable, it is essential that the defense be afforded the opportunity to confront the

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[18] *Id.* ("ASCLD/LAB will continue to fully support the many laboratories which are currently accredited under the Legacy Program . . . .").

lab analyst who developed the perpetrator profile with which the prosecution seeks to incriminate the defendant.

CONCLUSION

For the reasons set forth above, *amici* respectfully request that the judgment of the Illinois Supreme Court be reversed.

Respectfully submitted,

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APPENDIX

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APPENDIX A

A COLLECTION OF DOCUMENTED LABORATORY MISCONDUCT AND MISTAKES IN DNA TYPING [1]

1. San Francisco Police Department Criminalistics Laboratory (San Francisco, CA)

Contamination (2009): A DNA analyst contaminated controls with her own DNA in at least two cases. The contamination was not caught by the lab's quality assurance checks, but was discovered later, during an investigation prompted by a drug unit analyst's misconduct. A subsequent audit found that the lab suffered from "poor record keeping and a lack of cleanliness." Brent Begin, *Tainted DNA Adds to SFDP's Crime Lab Issues,* SF Examiner, Mar. 22, 2010. The SFPD lab was accredited by American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB) at the time the errors occurred and was subsequently reaccredited for another five year period. *ASCLD/LAB Inspection Report for San Francisco Police Department Criminalistics Laboratory*, Nov. 17-19, 2009 (available at http://www.cacj.org/documents/SF_Crime_Lab/Documentation/2009_ASCLAD_Audit_Report_SF_Crime_Lab.pdf) (noting that the lab is seeking reaccreditation); ASCLD/LAB website:

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[1] This is a representative list of forensic DNA typing misconduct and mistakes in law enforcement and private labs throughout the country that have been made public. It is not intended to be comprehensive. Entries are listed in reverse chronological order based on the approximate date when the mistake or misconduct occurred. All websites cited were last visited on September 1, 2011.

http://www.ascld-lab.org/labstatus/accreditedlabs.html (follow "San Francisco Police Department Criminalistics Laboratory, San Francisco, CA" hyperlink) (showing current Certificate of Accreditation).

2. **Houston Police Department Crime Laboratory** (Houston, TX)

Cheating Related to Competency (2007): Plagued with problems in its DNA unit, *see* No. 13 *infra*, the HPD Crime Laboratory finally reopened in 2006 only to close once again two years later when an internal affairs investigation revealed that the chief of the lab and another employee facilitated cheating on the technicians' competency exams. The HPD Crime Laboratory was accredited by ASCLD/LAB at the time the cheating occurred, and an ASCLD official said the incident would not affect the lab's accreditation status: "From time to time, laboratories do have issues, and we always try to work with them and help them resolve problems," the official said. Rosanna Ruiz & Robert Crowe, *HPD Again Shuts Down Crime Lab's DNA Unit*, Hous. Chron., Jan. 26, 2008.

3. **Minnesota Bureau of Criminal Apprehension Lab** (MN)

Contamination (2005): A lab analyst accidentally contaminated a DNA sample from a rape case in one county with a DNA sample from a rape case in another county. The lab released the results of the DNA typing of the contaminated samples to the prosecutor before the error was caught. The BCA Laboratory was accredited by ASCLD/LAB at the time of the error. When

interviewed about the incident, an ASCLD/LAB official stated, "[c]ontamination happens. You can't pretend it doesn't happen, but it's also not the end of the world." David Chanen, *Defense Attorneys Raise Concerns about DNA Sample Mix-up*, Minneapolis Star Tribune, May 20, 2005; *see also BCA Crime Lab Under the Microscope*, KSTP-TV News, May 20, 2005, *available at* http://www. corpus-delicti.com/mbca_2005.txt.

4. **United States Army Criminal Investigation Laboratory – Fort Gillem** (Forest Park, GA)

Contamination, Fraud & Mistakes (2003-05): A DNA analyst for the United States Army "admitted making a false entry on a control sample." Associated Press, *Worker in Army Lab May Have Falsified DNA Test Result*, USA Today, Aug. 27, 2005. The same analyst had been suspended a year earlier when contamination was detected in his typing process. *Id.* A review of the hundreds of cases he worked on in his ten years at the lab found that the analyst had made numerous mistakes and that "lab officials disagreed with his DNA test results 55 percent of the time in cases they could retest." Marisa Taylor and Michael Doyle, *Army Slow to Act As Crime-Lab Worker Falsified, Botched Tests*, McClatchy, Mar. 20, 2011; *see also* William C. Thompson, *Tarnish on the "Gold Standard": Understanding Recent Problems in Forensic DNA Testing*, The Champion 10 (2006) (hereinafter *Tarnish on the "Gold Standard"*). USACIL is the only full service forensic laboratory in the Department of Defense, and it was accredited by ASCLD/LAB at the time of this misconduct. USACIL Website: http://www.cid.army.mil/usacil.html.

5. **Identigene** (Houston, TX)

   Mistake & Bias (2004): After the Houston Police Department Crime Laboratory was shut down in 2002, *see #13 infra*, Identigene was one of three private laboratories hired to check the HPD Crime Lab's work. During re-testing, one Identigene DNA analyst mislabeled two DNA samples, resulting in an error that Identigene did not catch. When the HPD discovered the error, the DNA samples underwent a third round of testing. During this test, an Identigene analyst drafted three different reports regarding the DNA typing, but consulted with the HPDS and the Harris County District Attorney's office before issuing a final report, thus raising questions about bias and undermining the independent nature of the reported results. Roma Khanna, *Retesting of Crime Lab Work in Question*, Hous. Chron., Dec. 6, 2004, at A1.

6. **Washington State Patrol Crime Laboratories** (Multiple locations, WA)

   Contamination (2004): An investigation by the Seattle Post-Intelligencer into the state crime laboratories revealed systemic problems with DNA testing, including twenty-three DNA testing errors. In sixteen of those cases, evidentiary samples were contaminated with the examiner's own DNA (8 cases), from samples from other cases (3 cases), or from an unknown source (5 cases). Ruth Teichroeb, *Rare Look Inside State Crime Labs Reveals Recurring DNA Test Problems*, Seattle Post-Intelligencer, July 22, 2004, at A1. The Crime Laboratory Division was accredited by ASCLD/LAB at the time of these lab

failures. Washington State Patrol Website: http://www.wsp.wa.gov/forensics/flsbhome.htm.

7. **Cellmark Diagnostics** (Germantown, MD)

Contamination, Mistake & Fraud (2003-04): In at least twenty-five tests, DNA analyst Sarah Blair manipulated computer files in order to replace records of problematic controls (showing contamination in the negative control and/or problems with the testing in the positive control) with the results of "clean controls" from other DNA tests. Laura Cadiz, *Md.-based DNA Lab Fires Analyst Over Falsified Tests*, Balt. Sun, Nov. 18, 2004; Rick Orlov, *Lab Used by LAPD Falsified DNA Data*, L.A. Daily News, Nov. 19, 2004, at N1; Dr. Simon Ford, *Fraud Detection Through Case Reviews*, Powerpoint Presentation (Aug. 11, 2005, on file with PDS). Cellmark Diagnostics was accredited by ASCLD/LAB at the time the fraud occurred. Orchid Cellmark Company Timeline, http://www.orchidcellmark.com/about/companytimeline.

8. **Broward County Sheriff's Crime Lab** (Ft. Lauderdale, FL)

Contamination (2003): A DNA analyst contaminated evidence from a murder trial with DNA samples taken from a rape victim in another case. The tests on the murder and rape cases had been run in the lab on the same day. Paula McMahon, *Crime Lab Botches Murder Inquiry; Prosecutors Must Drop Charges After DNA Evidence is Contaminated*, Sun Sentinal (Ft. Lauderdale, FL), June 24, 2003, at 1A. The lab was accredited by ASCLD/LAB at the time of this lab failure. Broward Sheriff's Office

Website: http://sheriff.org/news_from_bso/display.cfm?pk=646.

9. **Indianapolis-Marion County Forensic Services Agency** (Indianapolis, IN)

   Fraud (1997-2003): In at least 64 cases, a DNA analyst "dry-labbed" control samples by reporting that he had performed testing according to protocol when he had in fact omitted the required controls. Vic Ryckaert, *Judge Asked to Halt DNA Retests: Crime Lab Less Than Candid About Cases Under Review, Attorney Says*, Ind. Star, Aug. 13, 2003, at 1B. ASCLD/LAB accredited the lab during this time period under its more rigorous international stadards. ASCLD/LAB Newsletter, March 2002 (available at http://www.ASCLD/LAB.org/communications/newsletters/2002_march_newsletter.PDF); Indianapolis-Marion County Forensic Services Agency Annual Report 2007 (announcing that FSA had become accredited under ASCLD/LAB's International Standards).

10. **Michigan Department of State Police Lansing Forensic Laboratory** (Lansing, MI)

    Cheating Related to Competency (2003): The administrator of the State Police Crime Lab had a subordinate take a mandatory bi-annual proficiency exam in his place. He was permitted to resign before his misconduct was made public. Keith Matheny, *Supervisor Accused of Passing Off DNA Test*, Traverse City Record-Eagle, Dec. 19, 2004.

11. Federal Bureau of Investigation Laboratory (Quantico, VA)

Fraud (2000-02): In over 100 cases, DNA analyst Jacqueline Blake "dry-labbed" control samples by reporting that she had performed testing according to protocol when she had in fact omitted the required controls. These "omissions rendered her work scientifically invalid and unuseable in court." Office of the Inspector General, U.S. Department of Justice, *The FBI DNA Laboratory: A Review of Protocol and Practice Vulnerabilities*, i (2004). Blake eventually pled guilty in federal court to a misdemeanor charge of providing false statements in her lab reports. *Id.* at ii. Her fraud was fortuitously discovered by a colleague at the lab, not the lab's internal quality assurance mechanisms. *Id.* The scope of the misconduct prompted the Office of the Inspector General to initiate an inspection and produce a comprehensive report detailing protocol and operational vulnerabilities and critiquing the lab's response to Blake's misconduct. *Id.* The FBI lab was accredited by ASCLD/LAB at the time of Blake's Fraud. *Id.* at 21; *see also Mueller Defends Crime Lab After Questionable DNA Tests*, USA Today, May 1, 2003, at 3A; Maurice Possley, Steve Mills & Flynn McRoberts, *Scandal Touches Even Elite Labs: Flawed Work, Resistance to Scrutiny Seen Across U.S.*, Chi. Trib., Oct. 21, 2004, at C1; Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. Rev. 163, 168 (2007).

12. **Florida Department of Law Enforcement Crime Lab – Orlando Regional Crime Laboratory** (Orlando, FL)

Cheating Related to Competency (2002): A lab analyst failed a competency and skill test, and then forged his answers to cover up his failure. The analyst was forced to resign, but the lab did not notify the State's Attorney's Office. Instead, the lab left it to the analyst to inform prosecutors about his misconduct, which he failed to do. Rene Stutzman, *State DNA Analyst's Data Forgeries Could Result In New Trial for Rapist*, Orlando Sentinel, July 25, 2002; Rene Stutzman, *Judge Rips FDLE Silence in Lab Flap*, Orlando Sentinel, Aug. 3, 2002. The Orlando Regional Crime Lab was accredited by ASCLD/LAB at the time of this misconduct. U.S. Department of Justice Office of the Inspector General Audit Division, *Compliance With Standards Governing Combined DNA Index System Activities At The Florida Department Of Law Enforcement Orlando Regional Crime Laboratory Orlando, Florida* (March 2011) (available at http://www.justice.gov/oig/grants/2011/g4011002.pdf).

13. **Houston Police Department Crime Laboratory** (Houston, TX)

Contamination, Fraud & Mistake (2002): After a local television station raised questions about the lab's testing procedures, the lab conducted an internal audit, which revealed improperly trained employees, samples contaminated by run-off from a leak in the roof, failure to perform quality control checks, and four instances of "dry-labbing," or reporting findings without having conducted tests. As a result, the city closed the

lab and sent samples to be re-tested at other facilities. Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. Rev. 163, 166 n. 19 (2007); *see also* Steve McVicker & Roma Khanna, *Crime Lab Chief Reveals Failings*, Hous. Chron., Apr. 2, 2003, at 17.

14. **Las Vegas Metropolitan Police Department Forensic Laboratory** (Las Vegas, NV)

Mistake (2002): In a sex assault case, a lab analyst mislabeled the male complainant's DNA reference sample with the male suspect's name. When the mislabeled DNA profile was run against a state database of unsolved crimes, it matched DNA from two other sexual assaults, causing the suspect to be mistakenly charged with the two previous crimes. The mistake was not discovered until the Clark County Public Defender's own forensic science expert conducted a review of the reports. Glen Puit, *Police Forensics: DNA Mix-up Prompts Audit at Lab*, Las Vegas Review J., Apr. 19, 2002, at 1B; Glen Puit, *DNA Evidence: Officials Admit Error; Dismiss Case*, Las Vegas R. J., Apr. 18, 2002.

15. **Michigan State Police Crime Laboratory** (Lansing, MI)

Contamination (2002): Results of DNA analysis suggested contamination when DNA samples from a murder victim included a DNA profile that implicated a man who was only four years old at the time the crime occurred. His known sample was being processed by the lab in connection with another case on the same day as the evidentiary sample from the murder case.

Tarnish on the "Gold Standard" at 14; *see also Murder Case DNA May Be Retested*, Ann Arbor News, May 11, 2005. The MSP lab was accredited by ASCLD/LAB at the time of this lab failure. Michigan State Police Website: http://www.michigan.gov/msp/0,4643,7-123-1593_3800-15901--,00.html.

16. **North Carolina State Bureau of Investigation** (Multiple locations, NC)

    Mistake (2002): DNA typing by the SBI lab mistakenly identified DNA from a bloodstain at the scene as belonging to the suspect; a private lab hired by the defense determined that the DNA actually matched the victim, indicating that samples had been switched or mislabeled at some point during the DNA typing. Phoebe Zerwick, *DNA Mislabeled in a Murder Case*, Winston-Salem J., Aug. 28, 2005. The SBI lab was accredited at the time of this error and the North Carolina Academy of Trial Lawyers cited this case and others as a reason for ASCLD/LAB to "do a thorough investigation and shut down the lab until they come up with better quality control." Phoebe Zerwick, *State Crime Lab is Faulted: Lawyer's Group Calls for Probe, Cites DNA Errors in Three Cases*, Winston-Salem J., July 20, 2005.

17. **Las Vegas Metropolitan Police Department Forensic Laboratory** (Las Vegas, NV)

    Mistake (2001): During DNA typing, a lab analyst switched the reference samples of the two suspects in a robbery case, resulting in the wrongful conviction of an innocent man. As a result of the error the lab said it would review more than 200 cases handled by the same lab

analyst. *See* Jackie Valley, *Metro Reviewing DNA Cases After Error Led to Wrongful Conviction*, Las Vegas Sun, July 7, 2011.

18. **Philadelphia City Crime Laboratory** (Philadelphia, PA)

    Mistake (1999): A lab analyst switched reference samples of the defendant and the complainant in a rape case, so that when the analyst tested the reference sample against what was thought to be DNA from seminal stains found on the complainant's clothing, there was a match. After retesting the DNA sample from the crime scene against the defendant's true reference sample, the lab determined that the DNA was actually from bloodstains on the complainant's clothing that matched only the complainant. *See* William C. Thompson, et al., *How the Probability of a False Positive Affects the Value of Forensic DNA Evidence*, 48 J. Forensic Sci. 47, 48-49 (2003).

19. **Cellmark Diagnostics** (Germantown, MD)

    Mistake (1995): A DNA analyst mistakenly switched the reference samples of a rape defendant and complainant and reported that the defendant's DNA profile matched the DNA sample taken from a vaginal swab. No one identified the error until the analyst testified during the trial; subsequently, the lab issued a report that the reference sample matched the complainant's own profile and excluded the defendant as a contributor. Thompson, 48 J. Forensic Sci. at 3. The Germantown laboratory was accredited by ASCLD/LAB at the time of the error. Orchid Cellmark Company Timeline, http://www.orchidcellmark.com/about/companytimeline.html.

20. LAB UNKNOWN (Tulsa, OK)

Mistake (1993): A lab developed a DNA profile from a rape kit. The profile was determined to match Timothy Durham, who was convicted of the crime and spent four years in prison. Post-conviction testing showed that Durham's DNA did not match the sample. The analyst had failed to completely separate the male from female DNA during testing; and the combination of the victim's alleles and the rapist's alleles on the electropherogram resembled Durham's genotype. Thompson, 48 J. Forensic Sci. at 3.

APPENDIX B

FORENSIC DNA LABORATORIES CURRENTLY ACCREDITED UNDER ASCLD/ LAB'S LEGACY PROGRAM

The following labs are listed on the website of the American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB), http://www.ascld-lab.org/accreditedlabs.html, as labs as being accredited under ASCLD/LAB's "Legacy Program" for "Biology" (unless accreditation specifies "Serology only"):

1. Alabama Department of Forensic Sciences, Birmingham Regional Laboratory, Hoover, AL
2. Alabama Department of Forensic Sciences, Huntsville Regional Laboratory, Huntsville, AL
3. Alabama Department of Forensic Sciences, Mobile Regional Laboratory, AL
4. Alabama Department of Forensic Sciences, Montgomery Regional Laboratory, Montgomery, AL
5. State of Alaska, Department of Public Safety, Scientific Crime Detection Laboratory, Anchorage, AK
6. Mesa Police Department, Forensic Services Section, Mesa, AZ
7. Tucson Police Department Crime Laboratory, Tucson, AZ
8. Arkansas State Crime Laboratory, Little Rock Laboratory, Little Rock, AR
9. Alameda County Sheriff's Office Criminalistics Laboratory, San Leandro, CA

10. Contra Costa County Sheriff's Department, Forensic Services Division, Martinez, CA
11. Kern County District Attorney, Regional Criminalistic Laboratory, Bakersfield, CA
12. Oakland Police Department Criminalistics Laboratory, Oakland, CA
13. San Bernardino County Sheriff's Office, San Bernardino, CA
14. San Diego County Sheriff's Department, Regional Crime Laboratory, San Diego, CA
15. San Diego Police Department Crime Laboratory, San Diego, CA
16. San Francisco Police Department Criminalistics Laboratory, San Francisco, CA
17. Santa Clara County District Attorney's Crime Laboratory, San Jose, CA
18. Serological Research Institute (SERI), Forensic Serological Analysis, Richmond, CA
19. Colorado Bureau of Investigation, Denver Forensic Laboratory, Denver, CO
20. Colorado Bureau of Investigation, Grand Junction Forensic Laboratory, Grand Junction, CO
21. Colorado Bureau of Investigation, Pueblo Regional Laboratory, Pueblo, CO
22. Connecticut Department of Public Safety, Forensic Science Laboratory, Meriden, CT
23. Palm Beach County Sheriff's Office, Forensic Sciences Division, West Palm Beach, FL
24. Northeastern Illinois Regional Crime Laboratory, Vernon Hills, IL

25. Indiana State Police, Evansville Regional Laboratory, Evansville, IN
26. Indiana State Police, Ft. Wayne Regional Laboratory, Ft. Wayne, IN
27. Indiana State Police, Indianapolis Regional Laboratory, Indianapolis, IN
28. Indiana State Police, Lowell Regional Laboratory, Lowell, IN
29. Kansas Bureau of Investigation, Great Bend Forensic Laboratory, Great Bend, KS
30. Kansas Bureau of Investigation, Kansas City Forensic Laboratory, Kansas City, KS
31. Kansas Bureau of Investigation, Topeka Forensic Laboratory, Topeka, KS
32. Sedgwick County Regional Forensic Science Center, Wichita, KS
33. Kentucky State Police, Central Laboratory, Frankfort, KY
34. Jefferson Parish Sheriff's Office Regional DNA Laboratory, Harahan, LA
35. North Louisiana Criminalistics Laboratory, Shreveport Headquarters Laboratory, Shreveport, LA
36. North Louisiana Criminalistics Laboratory, West Monroe Satellite Laboratory, West Monroe, LA
37. Maine State Police Crime Laboratory, Augusta, ME
38. Anne Arundel County Police Department Crime Laboratory, Millersville, MD

39. Armed Forces Medical Examiner System Armed Forces, DNA Identification Laboratory, Rockville, MD
40. Baltimore County Police Department Forensic Services Section, Towson, MD
41. Baltimore Police Department Laboratory Section, Baltimore, MD
42. Bureau of Alcohol, Tobacco and Explosives Forensic Science Laboratory – Washington, Beltsville, MD
43. Montgomery County Police Crime Laboratory, Rockville, MD
44. Boston Police Department Crime Laboratory Unit, Boston, MA
45. Massachusetts State Police Forensic Services Group, Central Laboratory at Maynard, Maynard, MA
46. Michigan Department of State Police, Grand Rapids Forensic Laboratory, Grand Rapids, MI
47. Michigan Department of State Police, Lansing Forensic Laboratory, Lansing, MI
48. Michigan Department of State Police, Northville Forensic Laboratory, Northville, MI
49. Mississippi Department of Public Safety, Jackson Crime Laboratory, Jackson, MS
50. Scales Biological Laboratory, Inc., Brandon, MS
51. Kansas City Police Department Crime Laboratory, Kansas City, MO
52. Missouri State Highway Patrol, Troop D Satellite Laboratory, Springfield, MO

53. Missouri State Highway Patrol, Troop E Satellite Laboratory, Cape Girardeau, MO
54. St. Charles County Sheriff's Department Criminalistics Laboratory, O'Fallon, MO
55. St. Louis County Police Department Crime Laboratory, Clayton, MO
56. St. Louis Metropolitan Police Department Crime Laboratory, St. Louis, MO
57. Nebraska State Patrol, Lincoln Crime Laboratory, Lincoln, NE
58. Las Vegas Metropolitan Police Department Forensic Laboratory, Las Vegas, NV
59. Washoe County Sheriff's Office Forensic Science Division, Reno, NV
60. Union County Prosecutor's Office Forensic Laboratory, Westfield, NJ
61. Metropolitan Forensic Science Center, Albuquerque Police Department, Albuquerque, NM
62. Erie County Central Public Services, Buffalo, NY
63. Monroe County Crime Laboratory, Rochester, NY
64. Suffolk County Crime Laboratory, Department of Health Services, Hauppauge, NY
65. Charlotte Mecklenburg Police Department, Charlotte, NC
66. DNA: SI Labs, Burlington, NC
67. North Carolina State Bureau of Investigation, Raleigh Laboratory, Raleigh, NC
68. North Dakota Office of Attorney General Crime Laboratory Division, Bismarck, ND

69. Canton-Stark County Crime Laboratory, Canton, OH
70. Cuyahoga County Regional Forensic Science Laboratory, Cleveland, OH
71. Mansfield Division of Police Forensic Science Laboratory, Mansfield, OH
72. Miami Valley Regional Crime Laboratory, Dayton, OH
73. Ohio Bureau of Criminal Identification and Investigation, Bowling Green Laboratory, Bowling Green, OH
74. Ohio Bureau of Criminal Identification and Investigation, London Laboratory, London, OH
75. Ohio Bureau of Criminal Identification and Investigation, Richfield Laboratory, Richfield, OH
76. Oklahoma State Bureau of Investigation, Forensic Science Center, Edmond, OK
77. Oklahoma State Bureau of Investigation, Northeast Regional Laboratory, Tahlequah, OK
78. Oklahoma State Bureau of Investigation, Southwest Regional Laboratory, Lawton, OK
79. Allegheny County Office of the Medical Examiner, Forensic Laboratory Division, Pittsburgh, PA
80. Pennsylvania State Police, DNA Laboratory, Greensburg, PA
81. Institute of Forensic Science of Puerto Rico, Criminalistics Laboratory San Juan, San Juan, PR
82. IntelliGenetics, LLC, Hilton Head, SC

83. South Carolina Law Enforcement Division Forensic Services Laboratory, Columbia, SC
84. Tennessee Bureau of Investigation, Knoxville Regional Crime Laboratory, Knoxville, TN
85. Tennessee Bureau of Investigation, Memphis Regional Crime Laboratory, Memphis, TN
86. Tennessee Bureau of Investigation, Nashville Regional Crime Laboratory, Nashville, TN
87. Austin Police Department Forensic Science Division, Austin, TX
88. Dallas County Southwestern Institute of Forensic Sciences, Dallas, TX
89. Houston Police Department Crime Laboratory, Houston, TX
90. Tarrant County Medical Examiner's Criminalistics Laboratory, Fort Worth, TX
91. Vermont Forensic Laboratory, Waterbury, VT
92. The Bode Technology Group, Inc., Lorton, VA
93. West Virginia State Police, Forensic Laboratory, South Charleston, WV
94. Wisconsin State Crime Laboratory, Madison Crime Laboratory, Madison, WI
95. Wisconsin State Crime Laboratory, Milwaukee Crime Laboratory, Milwaukee, WI
96. Wyoming Division of Criminal Investigation Crime Laboratory, Cheyenne, WY

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