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Appellate Division, First Department Case Nos. 2020-03746, 2021-00560

State of New York
Court of Appeals

In the Matter of the Application of

TERRENCE STEVENS, et al.,

Petitioners-Respondents,

—v.—

THE NEW YORK STATE DIVISION OF CRIMINAL JUSTICE SERVICES, et al.,

Respondents-Appellants.

For a Judgment Pursuant to Article 78
of the Civil Practice Law & Rules.

BRIEF FOR *AMICUS CURIAE* ERIN E. MURPHY
IN SUPPORT OF PETITIONERS-RESPONDENTS

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Amicus Curiae

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INTEREST OF THE AMICUS CURIAE

Amicus curiae Erin E. Murphy is the Norman Dorsen Professor of Civil Liberties at NYU School of Law. I am an internationally recognized expert in the field of forensic DNA. I authored a leading book on the use of forensic DNA in criminal cases, titled *Inside the Cell*, and edit multiple chapters (including the DNA chapters) of a well-known treatise on forensic evidence, titled *Modern Scientific Evidence.* I have also written numerous scholarly articles on the topic of familial searches of DNA databases, as well as on questions regarding DNA practices more broadly and the oversight of forensic laboratories. I am uniquely well positioned to provide this Court with important background around the enactment of Executive Law 995 *et seq.* that I believe will be of special assistance to this Court in its determination of the issues presented by the parties.

INTRODUCTION

New York has long been able to proudly claim its history as the first—and for many years, the only—state to legislate an oversight structure for forensic science. In 1994, the New York legislature created the Commission on Forensic Science ("Commission") and the DNA Subcommittee ("Subcommittee"),[1] and authorized the creation of a DNA database with compulsory collection of DNA from certain convicted

[1] *See* DNA Databank Act, Ch. 737, 1994 N.Y. Laws 3709 (codified at Exec. Law § 995 et seq.); *see also* ERIN E. MURPHY, INSIDE THE CELL: THE DARK SIDE OF FORENSIC DNA 49 (2015).

offenders.[2] The Commission's primary purpose was to develop a laboratory accreditation system and set of operating standards for the state's forensic laboratories.[3] The DNA Subcommittee was similarly empowered to accredit laboratories and set minimum operating standards for government testing of DNA samples—a brand new, highly technical forensic discipline.[4]

The history surrounding the inception of the Commission and the Subcommittee, as also reflected in the statutory text and structure enacted by the legislature, make plain that the legislature intended to task the Commission and Subcommittee with oversight activities to safeguard the quality and integrity of scientific evidence in criminal cases—not to delegate difficult policy questions about the scope of law enforcement use of DNA technology to an unelected body.

ARGUMENT

I. The History Of The Formation Of The Commission And Subcommittee Affirms That They Were Created To Perform A Technical Oversight And Quality Control Role, Not To Answer Complex Questions Of Public Policy Such As Whether To Engage In Familial Searches.

Forensic DNA evidence was first introduced in the United States in a criminal case in Florida in 1988, after its initial appearance in the United Kingdom.[5] But even

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[2] N.Y. Exec. Law § 995-c(3) (naming offenders convicted of specific crimes).
[3] *Id.* § 995-b(1). The term "forensic laboratory" was defined to include government-run laboratories that perform criminal forensic testing (e.g. hair analysis, firearms analysis, fingerprinting, etc.). *See id.* § 995(1).
[4] *See id.* § 995-b(13).
[5] *See* DAVID H. KAYE, THE DOUBLE HELIX AND THE LAW OF EVIDENCE 75, 104-31 (2010) (tracing history).

before its debut, prosecutors and forensic scientists recognized DNA's transformative potential. As early as 1987, the chair of the New York Laboratory Advisory Committee (NYLAC) wrote to the New York State commissioner of criminal justice services, observing that:

> There is so much potential for benefit to the criminal justice system that great care and careful planning are clearly required to insure that premature or improper application of the technology do not destroy its credibility in court . . . . Because of the importance and the technical and economic difficulties of proper application of DNA technology, I feel that the State should closely oversee this critical area. Overzealous police, prosecutors or labs should be discouraged from application to the wrong case or application of methods that cannot be shown to meet well defined standards of acceptance in the scientific community.[6]

Although DNA testing encountered little resistance in many early cases—in part because it had developed as a method in clinical and academic settings, and in part because public defenders were poorly equipped to challenge it—concerns persisted about the possibility of misuse.[7] Experts worried that the technology would eventually become discredited as a result of lax regulation, especially given that DNA was widely recognized as capable of revealing intimate medical, ancestral, and health information.[8] Recognizing these concerns, the New York Senate and Assembly held a joint hearing

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[6] JAY D. ARONSON, GENETIC WITNESS 92 (2007) (quoting Letter from Howard Harris to Lawrence T. Kurlander (10 November 1987) (on file with the Cold Spring Harbor Laboratory Archive)).
[7] *Id*. (describing the early days of DNA typing, including a chapter on the *Castro* case).
[8] *See* REPORT OF NEW YORK STATE FORENSIC DNA ANALYSIS PANEL (Sept. 6, 1989), Mario M. Cuomo, Governor, and John J. Poklemba, Director of Criminal Justice and Commissioner, at 27 [hereinafter "Poklemba Report"] ("Until private laboratories allow their procedures to be reviewed by the general scientific community, it will remain impossible to evaluate their merits.") (Attached as Ex. B1).

on forensic DNA in October 1988,[9] and then-Governor Mario Cuomo convened a panel of experts, including "forensic and research scientists, policy makers, legal scholars, and law enforcement experts" to broadly study and report on the "scientific, legal, and policy considerations" surrounding forensic DNA.[10]

By the time the expert panel issued its report a year later, a lot had happened in the world of forensic DNA. Perhaps most importantly, attorneys Barry Scheck and Peter Neufeld, both members of the Governor's expert panel, successfully litigated the nation's first major challenge to the admissibility of DNA evidence in the case of *People v. Castro*.[11] *Castro* raised objections about both the methods and quality control measures used for DNA testing in a *Frye* hearing that spanned three months and included testimony from all the leading experts in the rapidly-evolving field of DNA analysis.[12] World-renowned scientist Eric Lander served as a critical defense expert and attacked the DNA analysis as having been conducted using the wrong protocol, wrong control sample, contaminated material, and questionable statistics.[13]

But the decisive moment in the case came when, by happenstance, the leading prosecution and defense experts both attended a conference on genome sequencing that

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[9] GEORGE H. BARBER & MIRA GUR-ARIE, NEW YORK'S DNA DATABANK AND COMMISSION OF FORENSIC SCIENCE: AN ANALYSIS OF CHAPTER 737 OF THE LAWS OF 1994, INCLUDING THE COMPLETE TEXT OF THE NEW STATUTORY PROVISIONS (1994) (Attached as Ex. B2).
[10] Poklemba Report, *supra* note 10, at i-ii.
[11] 144 Misc. 2d 956 (N.Y. Sup. Ct. 1989).
[12] *Id.* at 957-58.
[13] *Id*. at 958.

occurred while the hearings were still ongoing. The prosecution's key witness, British molecular biologist Richard Roberts—one year away from winning the Nobel Prize—was particularly shocked to find that assumptions he had made about the existence of basic quality control measures were mistaken. After reading Lander's report, "Roberts became indignant toward both the prosecution (for withholding information from him) and the American legal system (for condoning a system in which deception is an accepted practice)."[14] He felt the system rewarded cunning, not truth, and so he coordinated a meeting among eight of the ten experts, from both the prosecution and defense, "in a forum where there was 'none of this lawyerly talk.'"[15] They hashed out their differences and ultimately issued "an unprecedented joint statement concluding that . . . [the] DNA evidence in the Castro case was not scientifically reliable."[16] Defense expert Lander raised further public awareness of the lack of adequate standards when he subsequently wrote an article in *Nature* magazine detailing his concerns with DNA testing,[17] in which he famously quipped that "[c]linical laboratories must meet higher standards to be allowed to diagnose strep throat than forensic labs must meet to put a defendant on death row."[18]

On August 14, 1989, the judge in *People v. Castro* issued an opinion partly

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[14] Aronson, *supra* note 6, at 71.
[15] *Id*.
[16] *Id.*
[17] Eric S. Lander, *DNA Fingerprinting on Trial*, 339 NATURE 501 (1989), *available at* https://www.nature.com/articles/339501a0.
[18] *Id.* at 505.

excluding the expert's testimony due to concerns about the quality of the execution of the DNA testing.[19] Together, the *Castro* case, Lander's *Nature* article, and a smattering of cases around the nation all ignited the flames of what became colloquially known as the "DNA Wars."[20] From roughly 1989 to 1996, in numerous cases and scientific forums, experts debated the legitimacy of DNA typing and match methods. As the scientific community battled it out in scholarly journals, the lawyers battled it out in court. Questions were raised about the methodological soundness of forensic DNA testing, the way the match probabilities were calculated for both random matches and database matches, and the lack of adequate laboratory accreditation and quality assurance standards to ensure that sound methodologies were soundly executed.

Just one month after the *Castro* court issued its opinion, on September 6, 1989, expert panel released its report. After reviewing the scientific, legal, and policy issues implicated by transferring academic and clinical DNA testing methods to a forensic context, the panel made recommendations as to the governance of forensic DNA in New York. Of particular concern was the emergence of private, for-profit companies that offered DNA testing services but refused to make transparent their methods and quality control mechanisms.[21] In pertinent part, the panel wrote:

> A systematic method is needed to *ensure that DNA technology is applied only in appropriate circumstances following established,*

[19] *Castro*, 144 Misc. 2d at 977.
[20] Aronson, *supra* note 6, at 120-45; Kaye, *supra* note 5, at 75, 104-31 (noting a "second wave" of cases after *Castro*).
[21] Poklemba Report, *supra* note 8, at 26.

> *scientifically-accepted principles*. *An Advisory Committee*, representing the law enforcement, scientific, legal and judicial communities, *should oversee the operation of the network*. The Advisory Committee would establish uniform standards for determining the types of evidence and documentation appropriate for forensic DNA analysis.
>
> The Panel also recommends the creation of a scientific Review Board, distinct from the Advisory Committee, to assist courts in evaluating the technologies used in a given case. The scientific Review Board would *examine the scientific standing and accuracy of a test for DNA typing*; if asked, its members would act as expert and impartial advisers to the courts. While the scientific Review Board's conclusions could be challenged, it would nevertheless assist judges faced with the difficulties of determining the *scientific validity* of a particular DNA test.[22]

Significantly, the panel also concluded that

> The creation of a DNA databank to assist law enforcement officials in solving crimes raises many complex issues. Substantial privacy concerns must be overcome before a DNA databank should be established. The Panel recommends that, if these privacy concerns are scrupulously satisfied through legislation and regulation, *legislation should be enacted* mandating that all persons convicted of violent sex crimes or other designated offenses be required to give specimens of their DNA to an authorized agency.[23]

In other words, the panel had two recommendations: the creation of a technical oversight body to ensure scientific validity—both of testing methods and of the laboratories executing those methods—and the creation of a DNA database, mandating samples from persons specifically described and for purposes specifically authorized by the legislative branch. The legislature followed suit, creating the statutory scheme at issue in this case. And those efforts proved prescient. In the years following, the

[22] *Id*. at iii (emphasis added).
[23] *Id.* at iii-iv (emphasis added).

"DNA Wars" raged, culminating in two blue-ribbon expert panels from the National Academy of Sciences that addressed the continued controversy over scientific and technical standards for DNA testing and match probabilities.[24] What neither the Panel nor the legislative branch intended nor anticipated, however, was that the Subcommittee would treat its charge to safeguard technical and scientific validity as a license to make sweeping policy judgments, such as whether to search the DNA database not for matches to convicted offenders, but to troll for non or near matches in order to create lists of offenders whose innocent family members would then be treated as genetic suspects.

II. The Statutory Powers And Composition Of The DNA Subcommittee And Commission, As Well As Its Routine And Regular Work, Affirm That It Was Established To Address Scientific And Technical Questions About Quality Control, Not To Make Policy Choices About The Scope And Use Of DNA Testing For Law Enforcement Purposes.

A. The statutory structure of the Commission and Subcommittee affirms that the legislature intended it as a quality control and assurance body, not a quasi-legislative body.

The history recounted in Part I is critical to understanding the purpose that animated the New York legislature's creation of the Commission and Subcommittee in 1994. In short, the Commission was established to address "[o]ne of the major criticisms of the use of DNA evidence in criminal prosecution," which "was the lack

[24] Aronson, *supra* note 6, at 153-72.

of minimum standards for laboratories that did DNA testing."[25] The structure of the statute reflects this purpose.

First, Executive Law § 995-a(1) creates the Commission, specifically designating fourteen members, including the Commissioner of the Division of Criminal Justice Services and the Commissioner of the Department of Health, who serve as ex officio members. Section 995-b defines the "[p]owers and duties of the commission." Subsection 995-b(1) outlines the Commission's primary task: to "develop minimum standards and a program of accreditation for all forensic laboratories in New York state, including establishing minimum qualifications [for directors and personnel]."[26] Subsection 995-b(2) clarifies that the purpose of such standards and accreditation is to safeguard quality and integrity and ensure accuracy, reliability, and coordination amongst entities.[27] Section 995-b(2-a) places accreditation of forensic DNA laboratories exclusively under the DNA subcommittee, granting it sole ultimate authority while providing for input from the Commission.[28] Subection (3) sets forth specific characteristics of the accreditation program and standards that the Commission must develop, including the need to address inspections, proficiency testing of analysis, quality control and quality assurance protocols, and

[25] BARBER & GUR-ARIE, *supra* note 9, at 5.
[26] N.Y. Exec. Law § 995-b(1).
[27] *Id*. § 995-b(2).
[28] *Id*. § 995-b(2-a).

annual review of certifications.[29] The Commission is also charged with implementing the new DNA database authorized by the legislature,[30] including how to compile it and ensure that records are accurate, complete, and protected from impermissible access or disclosure.

As the legislature charged the Commission with oversight of *all* forensic science testing (including disciplines like handwriting, firearms, hair, and other non-DNA methods of identification), the statute in Subsection (13) specifically carves out a separate "subcommittee on forensic DNA laboratories and forensic DNA testing."[31] This Subcommittee, per Subsection (13)(a), likewise consists of members who are specialists in the various scientific and technical aspects of DNA analysis—such as molecular biology, population genetics, forensic science, and laboratory operations.[32] Subsection (13) grants this Subcommittee three powers:

- Per Subsection (13)(b), the power to "assess and evaluate all DNA methodologies to be used for forensic analysis," and "make binding recommendations for adoption by the commission addressing *minimum scientific standards to be utilized in conducting forensic DNA analysis, including but not limited to, examination of specimens, population studies and methods employed to determine probabilities and interpret test results*";[33]

- Per Subsection (13)(c), the power to "make binding recommendations for adoption by the commission with regard to an *accreditation program* for

[29] *Id.* § 995-b(3). *See also* BARBER & GUR-ARIE, *supra* note 9, at 29.
[30] *Id.* § 995-b(9).
[31] *Id.* § 995-b(13)(a).
[32] *Id*.
[33] *Id*. § 995-b(13)(b) (emphasis added).

laboratories performing forensic DNA testing," including "internal and external proficiency testing";[34] and

- Per Subsection (13)(d), the power "to advise the commission on any other matters *regarding the implementation of scientific controls and quality assurance procedures* for the performance of forensic DNA testing, or on any other matters referred to it by the commission."[35]

As is evident both from consideration of these three topics together, from the language used by the legislature, and from the broader statutory context of the grant of authority to the Commission, the grant of authority to the Subcommittee to assess and evaluate methodologies pertains to *scientific and technical standards*, not policy questions about the scope or use of the database disguised as a "scientific methodology." For instance, the emergence of other new DNA testing methods, such as next generation sequencing, have made it not just feasible but increasingly expedient to test a person's entire genome, including all the coding regions that contain markers for future propensities.[36] But surely the DNA Subcommittee could not mandate that laboratories replace the current "junk" DNA profile standard with a database of profiles containing full genome sequences—a move that would fundamentally change the nature and character of the state's DNA database—simply by claiming they have recommended a new "methodology."

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[34] *Id*. § 995-b(13)(c) (emphasis added).
[35] *Id.* § 995-b(13)(d) (emphasis added).
[36] *See, e.g.*, Hanae Armitage, *Fastest DNA Sequencing Technique Helps Undiagnosed Patients Find Answers In Mere Hours,* STANFORD MED. NEWS CTR. (Jan. 12, 2022), *available at* https://med.stanford.edu/news/all-news/2022/01/dna-sequencing-technique.html.

The same is true of Subsection (11), which requires the Commission to follow the binding recommendation of the DNA Subcommittee in "designat[ing] one or more approved methodologies for the performance of DNA testing."[37] Again, the term "methodologies" here refers back to Subsection (13)(a)'s language, which is addressed to the Subcommittee. This also echoes the definition of "DNA testing methodology" in Section 995(3): "methods and procedures used to extract and analyze DNA material, as well as the methods, procedures, assumptions, and studies used to draw statistical inferences from the test results."[38] It speaks to questions like: which test kits are approved for forensic use? Is automated testing (e.g. "rapid" testing) sufficiently reliable to be used? How should testing evolve as science moves from Restriction Fragment Length Polymorphism (RFLP) methods to capillary electrophoresis to massively parallel sequencing? What are the thresholds to discard alleles as artifacts versus consider them authentic? Which software packages are permissible for reading the raw data? How should we compute match probabilities for random matches and database matches? When and how should we consider population substructure by ethnic group? Which probabilistic software programs are valid for use and in what kinds of case conditions?

The "methodology" language in Subsection (11) must also be considered in the context of Subsection (12), which speaks to *searches*. Familial searches are not so

[37] N.Y. Exec. Law § 995-b(11).
[38] *Id.* § 995(3).

much a testing and analysis method as a search technique. As such, if anything it is Subsection (12) that more readily applies, and it requires the Commission to "[p]romulgate standards for a determination of a *match* between the DNA records *contained in the state DNA identification* index and a DNA record of a person submitted for comparison therewith."[39] In other words, the language of Subsection (12) speaks to *matches* (not near-misses) *with profiles contained in the database* (not relatives, or persons *not* in the database). Familial searches—which are intentional *non*matches to profiles contained in the database in order to make guesses about the genomes of those *outside* of the database—clearly fall outside the Commission's statutory mandate both as a matter of law and practice. To be clear, to the extent that a policy dictating searches for matches within the database may, inadvertently, return partial matches (e.g. "inadvertent partial matches"), it is arguably within the scope of the Commission's power to deal with that happenstance by devising a policy that governs the reporting of such matches to law enforcement. But the Subcommittee and the Commission clearly lack the authority to affirmatively authorize a wholly different use of the database—*an intentional search for a non-match*—that is outside the statutory grant of authority.

Finally, it is also notable that Subsection (12), unlike Subsections (11) and (13), does *not* bind the Commission to the Subcommittee's recommendation. In other words,

[39] *Id.* § 995-b(12).

although the Commission is bound to accept the Subcommittee's recommendations as to scientific and technical methods, it is not bound to its recommendations as to the standards for a determination of a match. This further underscores that the "methods" in Subsections (11) and (13) do *not* include search methods, and are *not* intended to be formulated using only the technical expertise of the Subcommittee as opposed to the broader expertise of the Commission.

B. The statutorily-designated composition of the DNA Subcommittee underscores that its mandate is to offer scientific and technical advice, not to make sensitive judgments of policy.

The actual composition of the DNA Subcommittee—which the government claims the legislative branch empowered to *bind* the Commission to its recommendation to commence familial searches—affirms that the legislature intended to create a technical, not policymaking, committee. Indeed, one striking aspect of the Subcommittee is how poorly constituted and equipped it is to make policy recommendations, like whether New York should adopt familial searches. All members possess PhDs in science—hardly representative of the general population.[40] It appears that all or almost all are white, and most are men. Almost none live in New

[40] It is estimated that, as of 2022, roughly 2.1% of the U.S. population holds a Ph.D. *Educational Attainment in the United States:* 2022, U.S. CENSUS, at Tbl. 3 (*Detailed Years of School Completed by People 25 Yeares and Over by Sex, Age Groups, Race, and Hispanic Origin:* 2022) (last visited Aug. 1, 2023), https://www.census.gov/data/tables/2022/demo/educational-attainment/cps-detailed-tables.html. Moreover, of all science and engineering degrees, fewer than 4% are doctoral degrees. *See Science and Engineering Doctoral Degrees as a Percentage of Science and Engineering Degrees Conferred*, NAT'L CTR. SCI. ENG'G STATS. (2022), (last visited Aug. 1, 2023), https://ncses.nsf.gov/indicators/states/indicator/se-doctoral-degrees-to-all-se-degrees.

York. Several have what some could consider conflicts of interest when it comes to questions about whether to expand or rein in forensic DNA testing, because they are affiliated with or directly profit from for-profit companies that sell testing services to the government.

For instance, the longtime chair of the committee was Dr. Jack Ballantyne, a professor of chemistry from Florida. Of the five members from the DNA Subcommittee in attendance at the February 10, 2017 public hearing on familial searching, only Allison Eastman lived or worked in New York.[41] The other attendees were Eric Buel (a Vermont laboratory director); Frederick Bieber (a geneticist at Brigham & Women's Hospital in Boston who is a public champion of familial searching); Kenneth Kidd (a genetics professor at Yale); and Amanda Sozer (the founder of a Virginia-based for-profit company that sells genetic testing services to the government).[42] The Chair at the time of the hearing, Dwight Adams, was the Director of the University of Central Oklahoma's Forensic Science Institute and an advisor to a DNA analysis company that also profits from government DNA testing.[43] Other Subcommittee members have included Jenifer Smith (a former FBI agent and chemist who led D.C.'s crime lab until she resigned when its accreditation was suspended after an independent panel found the lab made errors and misrepresented those mistakes to

[41] Record at 788.
[42] *Id.*
[43] *Id*.

accreditors), Bruce Weir (a statistician from New Zealand now at the University of Washington); and Katherine Gettings (a forensic scientist with experience at Virginia's state lab and the private company Bode).

To be clear, each of these persons possesses the requisite expertise in the scientific and technical aspects of forensic DNA laboratory work. But a committee composed entirely of science PhDs—some of whom have a vested financial interest in expanding law enforcement's use of DNA testing, and most of whom are white men who live in states *other* than New York, is not the kind of committee that the legislative branch would entrust to make sensitive policy decisions that require the balancing of considerations of public safety, privacy, racial equity, the reach and scope of law enforcement operations, legal authority, and justice, much less political judgments specific to the New York populace. Rather, this membership reflects the legislature's clear intention that the binding recommendations the Subcommittee is empowered to offer are those that marshal *scientific* and *technical* knowledge and expertise—the kind of questions that transcend state borders or political judgments. By contrast, the question whether to authorize searches for non-matches in the database, so as to find relatives instead of convicted persons, is a policy determination that may be right for Florida, Texas, Utah, Virginia or Wyoming[44]—but not necessarily right for New York.

[44] A comprehensive report by the federal government on familial searching, published in 2017, found that over half of states do not engage in familial searches. *See* Sara Debus-Sherrill & Michael B. Field, NAT'L INST. JUST., UNDERSTANDING FAMILIAL DNA SEARCHING: POLICIES, PROCEDURES AND

Finally, it is true that the designated membership of the Forensic Science *Commission* includes persons with legal and ethical rather than scientific expertise, and members who at least generally live or work in New York. But, critically, the DNA Subcommittee did not present its recommendation as advice, nor does the government defend it as such. Rather, the Subcommittee set forward its recommendations as judgments regarding a "methodology" that, per the statute, would be *binding* on the Commission,[45] and the government's briefs urge this Court to affirm that authority.[46] Of course, as explained further in Part II, this interpretation would allow a Subcommittee composed entirely of scientists with no connection to New York to *mandate* adoption of sensitive genetic practices simply by calling them "methods"—practices such as testing for behavioral traits, genetic abnormalities, or other predispositions. The statute made certain Subcommittee recommendations binding because the Legislature did not want politics to usurp scientific judgment about quality control and accreditation. The Legislature never envisioned, much less intended, the reverse: that political judgments would be made by a committee of scientists in the guise of "technical advice" that would then bind the Commission.[47]

POTENTIAL IMPACT: SUMMARY OVERVIEW 9-10 (June 2017), https://www.ojp.gov/pdffiles1/nij/grants/251043.pdf.

[45] *See* Record at 852 ("[T]he DNA Subcommittee voted to issue a *binding* recommendation to the Commission on Forensic Science to accept the amended Familial Search Policy, regulations and Implementation Plan.") (emphasis added). *See also* Record at 861 (NY Register entry describing Subcommittee's power to issue binding regulations pursuant to N.Y. Exec. Law § 995-b(13)).

[46] *See* Respondents-Appellants' Br. at 49.

[47] Indeed, the legislature clearly did not intend the *Commission* to make these kinds of political judgments, as its composition also predominantly emphasizes technical expertise in forensics, not

C. The actual operation of the Subcommittee and Commission affirms its purpose as a technical body, and underscores the ultra vires *exercise of power in this case.*

The Subcommittee's and Commission's own work agendas throughout the years affirm that they understand their charge to "designate one or more approved methodologies for the performance of forensic DNA testing"[48] as about testing and analytical methodologies related to *quality control and assurance*, not policy judgments about the *scope* of collection, testing, or searching of DNA by law enforcement. Through a FOIL request, I received and reviewed the agendas for all Commission and Subcommittee meetings since 1996. Typical agendas of the Subcommittee include matters such as:

- *Accreditation*: Setting general standards that laboratories must meet to gain accreditation, as well as reviewing compliance of specific laboratories (e.g. every lab must have a testing protocol that requires a clean control sample to help identify instances of contamination, which in turn must be reported to a supervisor);

- *Sample collection protocols*: Determining what methods of collection are effective (e.g. the evolution from blood tests to mouth swabs; best practices for collecting crime scene DNA that may be degraded by light or heat; and sample storage and retention protocols);

- *Proficiency testing standards and auditing standards*: Developing standards to test the competence of analysts (e.g. random case pulls to reanalyze samples to ensure accuracy);

- *Form creation and standardization*: Creating and standardizing the documents used by laboratories to request testing and analysis;

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public and diverse representation. For instance, of the twelve members appointment by the governor, by statute all but two *must* be either lawyers, judges, or scientists, and over half must have government laboratory, prosecutorial, or law enforcement backgrounds.

[48] N.Y. Exec. Law § 995-b(11).

- *Vendor standards and approval, both for hardware and software*: Reviewing new products, such as typing kits that purport to be more accurate or efficient, or machinery and equipment for DNA testing and analysis. There is also an ever-evolving market in the software used to analyze DNA samples—most recently a number of vendors offered probabilistic genotyping software to interpret complex crime scene samples. The Subcommittee also held responsibility for overseeing the transition from Restriction Fragment Length Polymorphism (RFLP) methods to Short Tandem Repeat (STR)/Polymerase Chain Reaction (PCR) methods, as well as the initial adoption of the 13 core CODIS loci standard and later expansion to 20 core loci for identification;

- *Population genetics and statistics to compute the probability of a match*. Overseeing changes in how the significance of a match is calculated, including evolving research the statistical basis for such computations, debates over the preferred method of computing (such as a random match probability or a likelihood ratio), the expansion of racial and ancestral categories, and disputes over how to account for population substructure (i.e., the idea that certain racial or ethnic populations may have differing frequencies for certain markers);

- *Assimilation of federal standards into state practice*. Incorporating federal quality assurance and control standards into statewide standards as well as developing best practices around reports offered to the defense or courts.

- *Mass disaster planning and backlog processing*. Considering best practices for testing in the mass disaster context, given that 9/11 precipitated the need for mass testing of human remains and that New York remains vulnerable to mass casualty events, as well as devising ways of expediting testing to clear backlogs.

The question whether to engage in familial searches—to effectively expand the DNA database to include intentional searches for non-databased persons—fits poorly among this list of technical, scientific and administrative matters. And, it is worth noting: The Commission's agendas largely mirror those of the Subcommittee, except that the Commission deals with all forensic sciences, not just DNA. Overwhelmingly, even the Commission's agenda is addressed to accreditation, proficiency testing,

auditing, and quality oversight of labs. Lastly, it is worth observing that even the Commission's and Subcommittee's *own* materials describe themselves as technical bodies, not a policymaking ones:

> The Commission on Forensic Science and the DNA Subcommittee were established by Article 49-B of the Executive Law. The Commission is empowered to, among other things, *develop minimum standards and a program of accreditation for all forensic laboratories* in New York State. Accreditation of a forensic DNA laboratory is granted through the DNA Subcommittee. The Subcommittee also advises the Commission on any matter related to the *implementation of scientific controls and quality assurance procedures* for the performance of forensic DNA analysis.[49]

D. The legislative history affirms this reading of the statutory structure and powers of the Commission and Subcommittee.

This statutory structure—both the composition of these bodies and their specific charged duties—underscored that the purpose of the legislature in enacting the scheme at issue was to bring scientific and technical knowledge to bear in order to safeguard forensic evidence. It was never imagined that the Commission would supplant the legislative branch in making difficult policy decisions about DNA testing that implicate genetic privacy or the reach and scope of law enforcement surveillance. Rather, the Commission was very specifically crafted to address the technical complexity of forensic evidence, particularly DNA testing, and respond to the rapidly evolving scientific landscape that had left courts vulnerable to challenges they had little capacity

[49] N.Y. DIVISION OF CRIMINAL JUSTICE SERVS., *About OFS* (last visited July 20, 2023), https://www.criminaljustice.ny.gov/forensic/aboutofs.htm (emphasis added).

to untangle. It specifically responded to concerns from members of the defense bar, echoed to various degrees by courts, about the lack of formal quality assurance programs overseeing forensic testing.[50]

The memorandum filed with the bill reinforces this intention. It notes that, at the time, "[t]here [were] no existing federal or State regulations applicable to forensic DNA analysis; the admissibility of DNA test results . . . is generally decided on a case-by-case basis." And it describes with pride that this "landmark legislation" will provide for "the establishment of minimum standards and an accreditation program for forensic services in New York."[51] It further states that it "establishes a DNA subcommittee to review accreditation standards for forensic DNA analysis and make binding recommendations to the Commission concerning such standards."[52] Again, the focus was on delegating control over standard setting and laboratory accreditation in service of quality assurance and control, not on delegating policy judgments about the scope and use of the DNA database. The Attorney General's memorandum to the governor even reassured the government that "the bill includes measures to restrict narrowly the use of [DNA records]"[53]—indicating that the legislature understood the sensitive nature of genetic records, rather than an intention to empower an unelected

[50] BARBER & GUR-ARIE, *supra* note 9, at 29.
[51] Bill Jacket for ch. 737 (1994) at Bates No. 5 (Governor's Approval Mem. (Aug. 2, 1994)((Attached as Ex. B3).
[52] *Id*.
[53] *Id*. at Bates 12 (Letter from G. Oliver Koppell, Attorney General, to Mario Cuomo, Governor (July 20, 1994)).

subcommittee of scientists to undermine those narrowly prescribed uses.

The various government agencies that supported the bill consistently affirm this understanding—that the work of the Commission and Subcommittee would be to impose minimum standards and laboratory accreditations, *not* to make policy judgments about the scope or use of the database.[54] Most pertinently for this case, the Council on Children and Families, when asked to analyze the bill, acknowledged that DNA database could implicate familial privacy, but after studying the bill concluded that "this bill will have no direct, substantial impact on families or family policy."[55]

III. Allowing The DNA Subcommittee To Bind The Commission On Difficult Issues Of Public Policy Regarding Forensic DNA Testing, Under The Guise Of Its Power To Assess "Methodologies," Is Both Unworkable And Ill-Advised.

Allowing the DNA Subcommittee—an unelected body of persons, almost all of whom do not live in New York and have only *scientific* expertise—to reclassify a sensitive question of public policy as a technical question of scientific methodology will open the door to a never-ending set of challenges that the courts and the

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[54] For example, the Department of Health wrote that the bill addresses an important need for state standards governing proficiency testing and acceptable scientific methods and procedures for DNA testing." *Id.* at Bates 13 (Letter from Peter J. Millock, General Counsel, State Department of Health (July 25, 1994)). The Division of Probation and Correctional Alternatives lauded the "imperative" of oversight, reliability, and uniformity, and particularly noted that "Language limiting the authorized purposes for which records can be used strikes a fair balance" between privacy and public safety. *Id.* at Bates 16 (Letter from Linda J. Valenti, Counsel, Division of Probation and Correctional Alternatives (July 25, 1994)).

[55] *Id.* at Bates 21-22 (Letter from Frederick B. Meservey, Executive Director, State of New York Council on Children and Families (July 14, 1994)). This letter also observed that "[m]aintaining DNA records from large segments of the general population . . . raises many fundamental policy issues," but that such issues were not of concern as the bill is focused on "determining whether *known designated offenders* have been at the scene of another crime." *Id.* (emphasis added).

Commission are ill-equipped to decide, and that are better left to the democratic, legislative process. These are challenges that have already surfaced in other jurisdictions.

To give just a few examples: In San Francisco, a rape victim is suing the city after she provided a DNA sample in connection with her case, only to learn five years later that police had retained her data and used it to charge her with an unrelated property offense.[56] Canadian officials apologized after widespread criticism followed their announcement that they had asked a company to produce a predictive image—or a "genetic mug shot" from DNA collected from a crime scene, clearly going beyond "junk" DNA testing to examine physical traits.[57] In New Jersey, law enforcement is being sued for having obtained through subpoena the newborn blood spot drawn from an infant at birth for mandatory genetic screening, in order to link the infant's father to a 25-year old crime.[58] A similar scandal unfolded in Texas in 2010, after residents learned that Texas officials had obtained blood spots for the purpose of building a

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[56] Eduardo Medina, *Woman Sues San Francisco Over Arrest Based on DNA From Her Rape Kit*, N.Y. TIMES (Sept. 13, 2022), https://www.nytimes.com/2022/09/13/us/rape-kit-dna-san-francisco.html.

[57] Taylor Lambert, *DNA-Assisted Mug Shots In Law Enforcement Are Based On Dubious Science. So Why Would Edmonton Police Use Them?* CBC NEWS (Oct. 7, 2022), at https://www.cbc.ca/news/canada/edmonton/edmonton-police-phenotype-science-1.6609320.

[58] *New Jersey Office of the Public Defender v. New Jersey Department of Health*, No. MER-L-001210-22 (N.J. Sup. Ct. Mercer County July 11, 2022), *available at* https://www.documentcloud.org/documents/22084922-nj-office-of-the-public-defender-et-al-vs-department-of-health-et-al.

database for forensic DNA purposes.[59] As Americans' trust in institutions falls to historic lows,[60] it is critical not to allow an unelected committee to take actions that threaten faith in our systems of healthcare and law enforcement.

The government's proposed interpretation of the statute would permit this Subcommittee to authorize testing and search methods of breathtaking scope. Our knowledge of DNA is constantly evolving, and new techniques regularly emerge. The line between techniques that simply refine or improve on existing approaches, and those that fundamentally alter the scope and impact of law enforcement use of DNA, is far from clear. On one side, it is clear that the Subcommittee's power includes approval of new testing kits that expedite or improve processing times, or even incorporate new loci to meet the federal standard (as happened in 2017 when the federal government expanded from a 13-loci to 20-loci standard). On the other side, it is equally clear that an unelected body lacks authority to authorize law enforcement to conduct medical or behavioral trait testing on compelled DNA samples under the guise of a new "methodology." In the middle, of course, there may be difficult questions about where the precise line rests between a technical refinement and a policy

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[59] Emily Ramshaw, *DNA Deception*, TEXAS TRIBUNE (Feb. 22, 2010), at https://www.texastribune.org/2010/02/22/dshs-turned-over-hundreds-of-dna-samples-to-feds/.

[60] Jeffrey M. Jones, *Confidence in U.S. Institutions is Dow; Average at New Low*, GALLUP (July 5, 2022), https://news.gallup.com/poll/394283/confidence-institutions-down-average-new-low.aspx/; Amelia Thomson-DeVaux & Zoha Qamar, *What Happens When Americans Don't Trust Institutions?*, FIVETHIRTYEIGHT (July 8, 2022), https://fivethirtyeight.com/features/what-happens-when-americans-dont-trust-institutions/.

extension. But just because there is haze at the border does not mean there is no border at all.

This Court can readily hold that classic questions requiring scientific and technical judgment include topics such as the protocols a laboratory must have in place to be accredited; the type and extent of validation testing a laboratory must undertake before adopting a new typing kit; the standards that should apply for reading an electropherogram and calling legitimate versus spurious peaks; or adopting random match or likelihood ratio approaches to match probabilities. It can equally find that, at the other extreme, there are profound questions of policy that entail democratic, not just scientific, judgments—such as whether to test genetic material for sensitive coding traits such as physical or mental health or behavioral predispositions;[61] whether to

[61] Companies that offer such testing are proliferating, such as EasyDNA which purports to tell if "you like to play it safe or are more of a risk taker," and the "big five" traits of openness, conscientiousness (e.g. impulsive or not, disorganized or not, etc.), neuroticism, extraversion, and agreeableness. *See, e.g.*, *'Karmagenes' Personality DNA Test*, EASYDNA (last accessed Aug. 1, 2023), https://www.easy-dna.com/karmagenes-personality-dna-test/; *BEHAVIOR*, DNATESTINGCHOICE.COM (last accessed Aug. 1, 2023), https://dnatestingchoice.com/en-us/trait-testing/products/orig3n/behavior/4435 (offering DNA testing for "Addiction"; "Feelings"; "Physical Behaviors"; and "Tolerance"); *Personality DNA Test*, DYNAMIC DNA LAB'YS (last accessed Aug. 1, 2023), https://dynamicdnalabs.com/products/personality (testing for 30 traits related to "personality, mood, behavior and character"); Larry Cash, *Behavioral DNA: The Science Behind Job Performance*, SUCCESSFINDER (Aug. 12, 2022), https://www.successfinder.com/behavioral-dna-predicting-career-success/ (predicting "potential success across 500 of the most sought-after job roles"). Such testing would not be unprecedented—in the 1960s and 70s, "genetic researchers suggested an association between men who carry an additional Y chromosome ('XYY syndrome') and criminal behaviors." Maya Sabatello & Paul S. Appelbaum, *Behavioral Genetics in Criminal and Civil Courts,* 25(6) HARV. REV. PSYCHIATRY, 289–301 (Nov.-Dec. 2017), doi: 10.1097/HRP.0000000000000141. *See also State v. Yepez,* 483 P.3d 576, 589 (Ariz. 2021) (reversing appellate court and holding that "evidence of a mere genetic susceptibility to a given mental condition is not relevant on the issue of deliberate intent.").

expand mandatory DNA collection laws by DNA testing samples from arrestees, witnesses, relatives, or others; whether to test the whole, coding genome or just non-coding "junk" identification parts; under what circumstances to sell or share DNA data; and whether to use DNA databases for purposes other than matching a crime scene sample to a known convicted offender contained in the database. Demarking such lines does not impede justice but serves it.

Abuse of genetic data not only engenders distrust of law enforcement, but also undermines public confidence in our health and medical systems.[62] People may choose to share their DNA in any number of ways—such as on recreational sites, with healthcare workers, or through donating reproductive material such as sperm or eggs. They should also be able to trust that the bodies of law governing those disclosures should dictate the extent to which such information may be accessed or shared by law enforcement. When it comes to the forced and compulsory collection, testing, and databanking of DNA material by law enforcement, and its use and retention for purposes of solving crimes, the public should be able to trust that they have a voice in those rules via the legislative branch, which in our democracy carries primary responsibility to weigh the rights of individuals against concerns for public safety.

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[62] Leslie E. Wolf et al., *The Web of Legal Protections for Participants in Genomic Research*, 29(1) HEALTH MATRIX CLEVEL. 3 (2019), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6779301/ (describing need to reassure participants in NIH's "All of Us" and "Million Veterans" genome collection research projects in light of concerns about privacy).

CONCLUSION

For the reasons discussed above, this Court should hold that Executive Law §995 et seq. does not authorize the Forensic Science Commission and DNA Subcommittee to adopt and implement a policy and practice of familial DNA searches of the compulsory convicted offender database.

Respectfully Submitted,

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August 1, 2023

CERTIFICATE OF COMPLIANCE

This document complies with the word limit of the New York Court of Appeals Rule 500.13(c)(l) because it contains 6986 words (less than 7,000), excluding matter specified in Rule 500.13(c)(3).

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August 1, 2023

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COURT OF APPEALS
STATE OF NEW YORK

----------x

TERRENCE STEVENS, *et. al.*,

Petitioners-Respondents,

-against-

THE NEW YORK STATE DIVISION OF CRIMINAL JUSTICE SERVICES, *et. al.*,

Respondents-Appellants.

----------x

AFFIDAVIT OF SERVICE

Docket No.: APL-2022-00075

STATE OF NEW YORK
COUNTY OF NEW YORK
CITY OF NEW YORK

ERIN E. MURPHY, being duly sworn, deposes and says:

That on August 1, 2023, she served the foregoing upon Matthew Grieco, counsel for Respondents-Appellants, and Joseph Evall, counsel for Petitioners-Respondents, by electronic mail to Matthew.Grieco@ag.ny.gov and JEvall@gibsondunn.com, pursuant to the parties' agreement to such email service for motions for leave to file briefs for *amici curiae* by August 1, 2023.

Erin Murphy

Erin E. Murphy

EXHIBIT B

APL-2022-00075
New York County Clerk's Index 151522/18
Appellate Division, First Department Case Nos. 2020-03746, 2021-00560

State of New York
Court of Appeals

In the Matter of the Application of

TERRENCE STEVENS, et al.,

Petitioners-Respondents,

—v.—

THE NEW YORK STATE DIVISION OF CRIMINAL JUSTICE SERVICES, et al.,

Respondents-Appellants.

For a Judgment Pursuant to
Article 78 of the Civil Practice
Law & Rules.

COMPENDIUM OF CITED AUTHORITIES FOR BRIEF FOR *AMICUS CURIAE* ERIN E. MURPHY IN SUPPORT OF PETITIONERS-RESPONDENTS

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Amicus Curiae

August 1, 2023

COMPENDIUM OF KEY AUTHORITIES

Exhibit B1: Report of New York State Forensic DNA Analysis Panel (Sept 6., 1989), Mario M. Cuomo, Governor, and John J. Poklemba, Director of Criminal Justice and Commissioner.

Exhibit B2: GEORGE H. BARBER & MIRA GUR-ARIE, NEW YORK'S DNA DATABANK AND COMMISSION OF FORENSIC SCIENCE: AN ANALYSIS OF CHAPTER 737 OF THE LAWS OF 1994, INCLUDING THE COMPLETE TEXT OF THE NEW STATUTORY PROVISIONS (Matthew Bender & Co., New York) (1994).

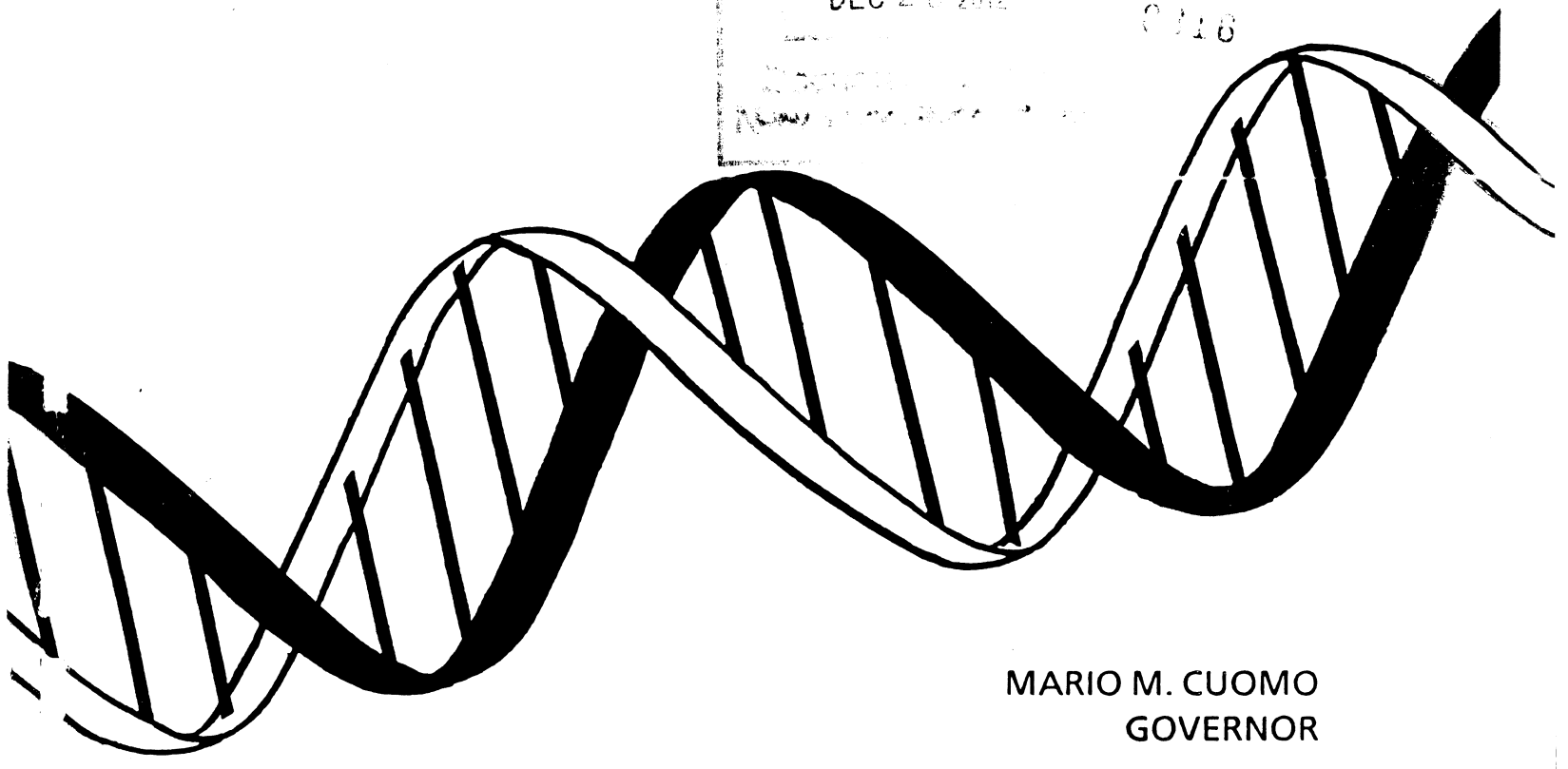
Exhibit B3: Bill Jacket for ch. 737 (1994), at Bates No. 5.

EXHIBIT B1

DNA

Report of New York State Forensic DNA Analysis Panel

September 6, 1989



MARIO M. CUOMO
GOVERNOR

JOHN J. POKLEMBA
DIRECTOR OF CRIMINAL JUSTICE
AND COMMISSIONER

EXECUTIVE SUMMARY

Recent advances in molecular biology have revolutionized the potential forensic applications of DNA, the basic genetic material contained in every cell in the human body. Rather than using literal fingerprints to establish identity, DNA can be used to identify a criminal -- or clear an innocent suspect -- based on a few drops of blood or semen, or roots of hair. It is this capacity to individualize, to focus in on one suspect to the exclusion of all others, that makes DNA so important to the criminal justice system.

The forensic utilization of DNA analysis technology requires that biochemical procedures originally developed for genetic research, clinical diagnosis and paternity studies be applied to criminal evidence. The transfer of a technology developed in a research laboratory to a forensic setting can be a complicated and time-consuming process. There are many hurdles that must be overcome, and many questions that must be answered. The power of this technology makes abuse a serious concern.

Rather than urging that New York rush headlong into the use of forensic DNA testing without first considering the possible pitfalls, John J. Poklemba, the State Director of Criminal Justice and Commissioner of the Division of Criminal Justice Services, formed the Forensic DNA Analysis Panel in July 1988. The Panel, which is made up of prosecutors and defense attorneys,

forensic and research scientists, policy makers, legal scholars, and law enforcement experts, was asked to undertake a broad-based study of all of the complex issues associated with forensic DNA testing.

The report examines the scientific, legal and policy considerations inherent in the forensic applications of DNA technology. The scientific issues discussed include the limits of traditional identification techniques, the procedures and assumptions underlying DNA testing, the problems associated with existing technologies and population studies, and the concerns over quality control and subjective assessments. The legal issues section of the report overviews court rulings throughout the country on the admissibility of forensic DNA evidence and discusses the different standards that should be applied when DNA testing results are introduced as evidence for exclusion purposes compared to when they are introduced for inclusion purposes. The discussion in the policy issues section centers on the concerns raised by the testing procedures currently used by the private and public laboratories performing DNA analysis.

At the heart of the Panel's recommendation is a model program for implementing forensic DNA analysis technology in New York State. The Panel recommends the creation of a Statewide DNA network, served ultimately by at least three regional forensic DNA analysis laboratories. The DNA analysis network would

coordinate quality assurance, quality control and safety for the laboratories in the network. An accreditation process would be developed to monitor public and private laboratories providing forensic DNA analysis services throughout the State.

A systematic method is needed to ensure that DNA technology is applied only in appropriate circumstances following established, scientifically-accepted principles. An Advisory Committee, representing the law enforcement, scientific, legal and judicial communities, should oversee the operation of the network. The Advisory Committee would establish uniform standards for determining the types of evidence and documentation appropriate for forensic DNA analysis.

The Panel also recommends the creation of a Scientific Review Board, distinct from the Advisory Committee, to assist courts in evaluating the technologies used in a given case. The Scientific Review Board would examine the scientific standing and accuracy of a test for DNA typing; if asked, its members would act as expert and impartial advisers to the courts. While the Scientific Review Board's conclusions could be challenged, it would nevertheless assist judges faced with the difficulties of determining the scientific validity of a particular DNA test.

The creation of a DNA databank to assist law enforcement officials in solving crimes raises many complex issues. Substantial privacy concerns must be overcome before a DNA databank should be established. The Panel recommends that, if

these privacy concerns are scrupulously satisfied through legislation and regulation, legislation should be enacted mandating that all persons convicted of violent sex crimes or other designated offenses be required to give specimens of their DNA to an authorized agency. To implement the databank, New York State should begin the preliminary developmental work needed to overcome the many technical problems inherent in building a computerized DNA databank.

DNA fingerprinting captures the imagination. It is new science in the making, one with untold potential for criminal justice. Yet, without careful planning its promise may be lost and the technique discredited. The report issued today is designed to assist policy makers and jurists as they chart a course for the future of forensic DNA analysis in New York State.

TABLE OF CONTENTS

INTRODUCTION

Recent advances in molecular biology have revolutionized the potential forensic applications of DNA, the basic genetic material contained in every cell in the human body. Rather than using literal fingerprints to establish identity, DNA can be used to identify a criminal -- or clear an innocent suspect -- based on a few drops of blood or semen, or roots of hair.

While other forensic techniques can be used to exclude a suspect or indicate the likelihood of a suspect's involvement in a crime, DNA analysis can be used to indicate that a particular suspect was indeed present at a particular crime scene. It is this capacity to individualize, to focus in on one suspect to the exclusion of all others, that makes DNA so important to the criminal justice system.

DNA analysis was originally developed for genetic research, clinical diagnosis and paternity studies. Scientists working in these areas can apply DNA technology under readily controllable conditions to fresh, hygienic, and ample blood samples. Unlike samples used in traditional laboratory research, samples taken from crime scenes are usually of limited quantity and are frequently mixed with foreign substances, such as dirt and other contaminants. The transfer of a technology developed in a research laboratory setting to a forensic setting can be a complicated and time-consuming process, and there are many hurdles that must be overcome.

It is critical that DNA typing techniques used in forensic tests meet appropriate scientific standards. It is also imperative that careful attention be paid to the special legal issues that surround the application of DNA technology to the criminal justice forum, where questions of admissibility of evidence are far more complex than in civil cases where DNA evidence was first introduced.

The New York State Crime Laboratory Advisory Committee and experts from a variety of disciplines have expressed concern that the exciting promise of DNA to positively identify a criminal could be compromised by lack of planning, failure to develop standards and precipitous action. The attention focused on DNA technology by the media, academic, scientific and policy making communities has continued unabated since it was first introduced into evidence in a criminal trial in Florida in 1987. Unless proper safeguards are instituted, this attention, combined with a lack of appreciation for the complexity of the technology, could severely impede full and proper implementation of this scientific advance.

The rapid, increasing involvement of DNA in criminal cases signals that the time has come to ask some hard questions about the appropriate forensic use of the technology.

What are the limits of DNA for the criminal justice system? Should there be a uniform system of minimum statewide or national standards? Should there be mandatory accreditation of public and private laboratories? What are the fiscal implications? The

philosophical questions? What are the legal issues? What about law enforcement training? Should New York State establish a computerized genetic database?

These are the questions that led John J. Poklemba, the New York State Director of Criminal Justice and Commissioner of the Division of Criminal Justice Services, to convene a panel to develop a systematic, broad-based approach to the forensic application of DNA technology. Commissioner Poklemba formed the Forensic DNA Analysis Panel in August 1988 to study these questions and to recommend a model for coordinating the statewide use of the technology.

Because of the broad spectrum of issues involved in the forensic application of DNA technology, Commissioner Poklemba invited experts from a variety of fields to serve on the Panel. The Panel's Chairman is Dr. Howard Harris, the Director of the Monroe County Public Safety Laboratory. Panel members include prosecutors and defense attorneys, forensic and research scientists, policy makers, legal scholars, law enforcement experts and a jurist. The names and professional affiliations of the Panel members are presented in Appendix I of this report.

Although the Panel members have differing perspectives on the criminal justice system, we are unanimous in our underlying recommendation: New York State should begin at once to cautiously implement a model program for forensic DNA analysis testing.

This report begins with a discussion of the major scientific, legal and policy issues surrounding the forensic application of DNA analysis techniques. It concludes by recommending a model program, complete with regional laboratories and statewide standards, for the application of forensic DNA testing procedures. The Panel hopes that its report will be of assistance to policy makers as they seek to chart a course for the future of forensic DNA analysis.

I. SCIENTIFIC CONSIDERATIONS

Limits of Traditional Techniques

The importance of the science of serology, which is the study of biological fluids, in law enforcement has grown significantly in the last few decades. Originally serological techniques were used primarily to distinguish blood stains from other dark-colored stains. As the science developed, forensic serologists were able to classify stains according to the ABO blood typing system,[1] thereby adding a much-needed degree of specificity to the identification process.

The ABO blood typing system has a low differentiating power, however. There are only four different blood types in the ABO system, and over 80 percent of the population is type A or type O. Consequently, a finding that an evidentiary stain is type A, for example, and that the suspect is also type A has limited value for identification purposes since about 40 percent of the population is type A. As a result of the inability to match an evidentiary stain to one specific individual, some courts in New York State have excluded testimony on ABO typing. Nevertheless, while the blood typing system is of limited value for inclusory purposes, its exclusionary value is extraordinarily important.

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[1] The ABO blood typing system is the basic system of typing antigens of human blood. There are four ABO blood groups - A, B, AB, and O.

By the 1970s, forensic serologists had made great strides in their ability to narrow the potential population from which a sample could have originated. Developments in the application of enzyme analysis[2] allowed blood samples to be classified with greater specificity. Several enzymes occur in the blood in different forms, or isozymes, and testing procedures have been developed to allow scientists to use population data bases to determine the proportion of persons with certain isozymes in their blood. By using both ABO blood typing procedures and enzyme analysis, scientists can reduce the range of persons from whom a blood sample could have been derived. If either the blood type or the form of any enzyme found in the evidentiary stain differ from those found in the blood samples obtained from victims or suspects, there is no match. If the evidentiary stain and the blood sample match in all respects, scientists consult population statistics to determine the probability that the match could arise randomly in the general population.

Enzyme analysis is a major improvement over simple ABO blood typing, yet serious problems exist with the reliability of this technique for forensic purposes. The technique is reliable only with fairly clean, dried blood stains of reasonable size that have been preserved promptly. In the majority of forensic cases, these conditions are not met. Enzymes are fragile and often degrade under crime scene conditions.

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[2] Enzymes are complex proteins that are produced by living cells and catalyze specific biochemical reactions.

Most of the enzymes used in characterizing blood are not present in sufficient amounts for forensic analysis in semen or other body fluids. In sexual assault cases, obtaining useful enzyme data from semen stains is the exception rather than the rule. Legal controversy about the reliability of widely used methods for enzyme analysis has reduced the utility of the technique in some jurisdictions.

While its ability to discriminate between individuals is vastly superior to the ABO blood typing system, enzyme analysis cannot pinpoint with specificity the source of a blood stain. Rather, where a match is found, the technique can generally demonstrate that the probability of the match occurring by chance is 1 out of 100; in the rare case, it may be possible to demonstrate a 1 out of 50,000 probability of a random match. Such limited degrees of certainty should be insufficient in the criminal justice context.

Another blood typing technique, the HLA white blood typing system[3], is widely used for paternity testing. Unfortunately, this typing system requires fresh liquid blood samples; it is not useful with dried blood stains.

Unlike scientists who analyze fresh blood stains, forensic scientists, who must work with dried evidentiary stains, have long been frustrated by their inability to demonstrate conclusively that an evidentiary stain came from a particular

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[3] The human leukocyte antigen (HLA) typing system types red-cell enzymes and serum proteins.

individual. Thus, while the potential for forensic serology to aid in the analysis of samples taken from scenes of violent crimes is great, it has often failed to achieve useful results. Crime laboratories have devoted an ever increasing share of scarce resources to forensic serology, and although they have seen improvements, no major breakthrough in their ability to make unambiguous identifications based on dried body fluid was possible until the arrival of forensic DNA analysis techniques.

Emergence of Forensic DNA Analysis Techniques

The era of molecular genetics that led to the development of forensic DNA typing began with a publication in 1953 by Drs. J.D. Watson and F. Crick of a structure for deoxyribonucleic acid (DNA). The identification of this structure - the double helix - immediately led to extraordinarily rapid advances in understanding the genetics of bacteria and viruses.

The application of knowledge derived from molecular genetics to human beings was much slower and had to await the development of recombinant DNA techniques[4] in the early 1970s. The ability to clone human genes resulted in a revolution in human genetics. Forensic DNA typing is a derivative of methods and procedures developed for the analysis of human inherited disorders.

The primary impetus for forensic DNA applications originated with the success of a major criminal investigation in England in

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[4] Recombinant DNA techniques use DNA molecules that have been assembled with the use of restriction enzymes; this frequently involves splicing together fragments from different species.

1987 and with the use of DNA typing to identify family members in immigration cases. Since then, there has been an intensive effort by private laboratories and governmental agencies to implement these techniques in the United States.

Forensic applications of the technology are markedly different than the medical applications from which they were derived. In medical genetics, it may be possible to identify the exact mutation in a gene and examine an individual for that precise mutation. The more common medical application, however, is to use DNA markers to follow the inheritance of a mutation within a family. Family members are analyzed, and the results provide internal controls and checks on the performance of the analysis. Unlike the medical setting, in forensics a single evidentiary sample is compared with a single sample from one or more suspects, and there is no opportunity for detecting inconsistencies in the analysis.

DNA typing does not analyze all of the DNA of an individual; rather DNA at a limited number of small sites is analyzed. The information obtained from any one site is limited in terms of unique identification, and the power of DNA typing comes from combining the results from tests of four or five separate DNA regions.

The process of DNA analysis begins when biological material is chemically treated to extract the DNA. The DNA is then cut into small fragments by restriction endonucleases, which are enzymes that recognize and cleave at specific sequences in DNA.

Fragments from different samples are placed in adjacent lanes on an agarose gel and separated on the basis of their size by the process of electrophoresis.[5] The DNA pattern in the gel is then transferred to a membrane using a technique known as Southern Blotting, following which a radioactive DNA probe[6] is applied to detect a specific sequence in a DNA fragment bound to the membrane. Thereafter, X-ray film is used to locate the positions of probe bindings on the membrane; once the X-ray film is developed, it is known as an autoradiograph[7] and a visible pattern of bands is produced. This pattern corresponds to places where the probe binds to the DNA fragments on the membrane. Genetic differences among individuals are reflected in the molecular weights (sizes) of these fragments, and these differences will affect the positions of the bands on the gel.

If a highly polymorphic genetic system[8] is chosen such that most individuals within a population have differently sized

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[5] Electrophoresis describes the movement of charged molecules or particles through a fluid or gel under the action of an electromotive force applied through electrodes in contact with the gel.

[6] A probe is a small fragment of DNA of known sequence that has been tagged with some tracer substance (a radioactive isotope or specific dye-absorbing compound). It is used to locate and identify the complementary sequence of a DNA fragment on a membrane or region of a chromosome.

[7] Autoradiography is a technique for detecting radioactively labeled molecules in a cell or tissue. An autoradiograph is an image on photographic film.

[8] Polymorphic systems are ones that contain variant forms of a specific gene that occur simultaneously in a population.

bands, then two individuals can easily be distinguished by performing these techniques. If all the bands match precisely using such a system, it can be said with near certainty that the different samples being tested came from the same person, or from identical twins.

It is clear that a revolution in criminal justice is imminent if DNA typing proves acceptable in criminal courts. Personal identifications have always been a major concern of law enforcement, and eyewitness testimony can be unreliable and subject to abuse. With the advent of forensic DNA typing, biological materials found at crime scenes take on unprecedented significance for identification purposes. Individuals erroneously accused of crimes could be cleared of suspicion; alternately, defenses could be rebutted. If DNA testing gains widespread acceptance, it could substantially alter the nature of plea negotiations, with prosecutors less likely to make relatively lenient offers to defendants and defendants less likely to challenge the allegations made against them. Moreover, the number of unsolved crimes might be significantly reduced if a national computerized databank of DNA typing information were created.

Basic Assumptions Underlying DNA Typing

Certain features of the principles and techniques of DNA typing are critical to understanding the task involved in introducing DNA typing into forensic science and the legal system.

The first basic assumption concerns the uniqueness of each individual's DNA. The genetic code carried by the DNA, which is wrapped up in the chromosomes of almost every type of cell in the body, determines, along with environmental influences, everything that makes each of us unique. That is, although we all have DNA molecules, and although these molecules in each of us code for the same proteins, there are subtle differences between everyone's DNA (except that of identical twins). These differences at the DNA level mirror the differences at the protein level that forensic scientists already exploit through enzyme analysis techniques. The uniqueness assumption is fully accepted in the scientific community.

A second basic assumption fully accepted by experts in the fields of population genetics and human molecular genetics concerns the validity of the theories underlying DNA typing. Scientists agree that DNA samples from different individuals can be distinguished from one another by examining polymorphisms at the DNA level, provided that the correct population studies have been performed. As with the first assumption, this is analogous to the examination of protein polymorphisms by forensic scientists, but it is more useful because DNA polymorphisms are more highly variable. The use of DNA polymorphisms has been fully validated in medical genetics, although in that field analyses are done by analyzing DNA samples within families rather than by comparing known and unknown samples, as in forensic applications. Nevertheless, the principles are fully accepted.

The third basic assumption is that the laboratory procedures used to perform the various steps in DNA typing are capable of doing what is required. Thousands of molecular biologists and geneticists throughout the world perform the same types of laboratory procedures as do forensic scientists when they carry out DNA typing; Appendix II describes these procedures, which include restriction enzyme digests, agarose gel electrophoresis, Southern transfers, probe labelling, filter hybridizations and autoradiography. The theoretical reliability of all these techniques is fully accepted; however, their actual implementation in the laboratory is a different matter.

Implementation Problems

Differing Systems and Population Studies

While the scientific principles and practices underlying DNA typing are generally accepted in the scientific community, there are serious questions with forensic DNA testing as it is currently being practiced. An overview of these problems is presented below, and a fuller discussion is included in Appendix II.

Several polymorphic systems have been developed, and laboratories throughout the country use different systems. The assumption that DNA polymorphisms can distinguish among individuals is accepted, but it must be shown that each polymorphic system performs as claimed by its proponents. No consensus exists on which of the available systems is optimal, or even whether all of the systems are reliable for forensic

purposes. Further, it is inevitable that new polymorphism systems will be discovered.

It must be shown that each probe-enzyme combination used in the polymorphic system produces the claimed fragment sizes, and that population studies performed to determine the frequencies of these fragments in the general population are reliable. Approval of any one polymorphic system does not confer automatic approval of other systems; each must be assessed on its own merits.

Without knowledge of the frequencies of certain alleles,[9] as represented by DNA fragment sizes, in a population, it is impossible to calculate the likelihood that a match could arise simply by chance. Such knowledge is critical and depends on the integrity of the laboratory collecting the data. Population studies are time consuming and, in contrast with laboratory procedures, they are unlikely to be replicated. Furthermore, analysis of the basic data is not straight-forward, and no generally accepted procedure exists for carrying out these analyses.

Forensic Samples and Quality Control

The world-wide use of the techniques involved in DNA typing does not guarantee their correct implementation in forensic science. Certain methodological problems are unique to the forensic application of DNA technology. Foremost is the probable poor quality of the forensic DNA as compared with that used in

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[9] An allele is one of several alternate forms of a gene occupying a given place on the chromosome.

medical genetics laboratories. Forensic samples are often affected by environmental factors such as heat, moisture and the activities of microorganisms contaminating the sample. Consequently, a large number of DNA samples are unusable because of degradation of the DNA. Furthermore, forensic samples of DNA may be too small to analyze, or too small to allow for repetition of the analysis. Forensic laboratories and their users must appreciate that not every test will produce data that can be interpreted reliably.

There are other methodological problems concerning quality control and assurance techniques that are common to all laboratories using DNA typing techniques. These problems are magnified in forensic and medical laboratories where the results of the analyses often have an immediate and pronounced effect on peoples' lives. It is absolutely essential that these problems be resolved and that the most stringent controls be implemented.

There are no widely accepted criteria for quality control or proficiency testing for forensic laboratories at a state or national level. Concern is mounting in the scientific community that the forensic laboratories performing DNA typing are not following all of the necessary and appropriate practices. If proper quality control procedures are not used, the reliability of the data produced is questionable. These concerns are discussed in greater detail in the section of this report on private and public laboratories.

Subjective Assessments

Despite the remarkable statistics that have been quoted in court cases, and the very impressive nature of DNA data as evidence, all stages of DNA analysis require some form of subjective assessments. Judgements must be made about whether a DNA sample is of adequate quality for testing; whether a restriction enzyme reaction is satisfactory; whether an autoradiograph is of sufficient quality to read and interpret; whether the most appropriate method is being used to compare samples. It is important that the legal and policy making communities resist being overwhelmed by the technicalities of DNA typing and remember that complexity does not guarantee infallibility.

II. LEGAL CONSIDERATIONS

Admitting DNA Evidence in Court

Under our legal system, juries have the inherent responsibility of deciding questions of fact. To assist juries in carrying out their duties, the criminal law permits opinion testimony from qualified experts as long as a proper foundation for the experts' testimony has been laid. Our adversarial system of justice gives the opposing parties equal opportunities to present expert testimony. Opponents are free to cross-examine and impeach proponents' experts, as well as to adduce different opinions through their own experts.

Opinion testimony from an expert is admissible where the conclusions to be drawn from the facts depend upon professional or scientific knowledge or skill not within the range of lay persons' experience or training. Judges preview the evidence to ensure its reliability before deciding whether it should be submitted to the jury.

When the facts from which the expert's conclusion is drawn are themselves the product of a scientific technique, the judge must first rule upon the reliability of the technique. The standard for admissibility, known as the Frye test,[Frye v. U.S., 293 F. 1013 (D.C.Cir. 1923)], has been applied in the courts of New York whenever the prosecution or defense seeks to introduce the results of a new scientific test.

In Frye, the Court of Appeals of the District of Columbia stated at page 1014: "Just when a scientific principle or

discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere, in the twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs."

At a pre-trial Frye hearing, the court must determine whether the underlying scientific principles, technique and results are generally accepted as reliable within the appropriate scientific community.[10] Applying this standard to the admissibility of forensic DNA typing, the judge must decide whether the prosecution has met its burden of demonstrating that the laboratory technique, including protocols and scientific controls, for declaring a match and the methods used to calculate population probabilities are generally accepted as reliable by the relevant scientific communities. Even if these Frye requirements are met, before the judge can let the evidence go to the jury, the court must be satisfied that the testing laboratory actually used and properly followed the generally accepted methods in the particular case.

Courts in twenty-four states have admitted forensic DNA evidence at least once in criminal cases, with Florida leading

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[10] People v. Hughes, 59 NY 2nd 523, 537 (Ct. of Appeals, 1983).

the other states, having admitted DNA forensic analysis evidence at least fifteen times to date.[11] At least thirty Frye hearings on the admissability of DNA evidence have been completed nationwide. With one exception, the trial courts have uniformly found that forensic DNA typing passes the Frye test.

There have been at least thirty Frye hearings conducted across the country. The first, and until recently the only, Frye hearing[12] to exclude DNA evidence was decided in California and involved the admissibility of a polymerase chain reaction DNA test,[13] the results of which excluded the defendant. Just three months earlier, the same test performed by the same laboratory passed Frye in a Texas court in which the evidence was a match and thus offered by the prosecution.

Three Frye hearings have thus far been conducted in New York. The first, a consolidated evidentiary hearing in two unrelated cases, People v. Wesley and People v. Bailey, 533 N.Y.S. 2d 643 (1988), upheld the prosecutor's motion to extract blood from defendant Bailey for the purpose of comparing his DNA

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[11] The other states to admit DNA evidence are New York, Maryland, Virginia, Texas, Washington, Michigan, Oklahoma, South Carolina, Kansas, Ohio, Indiana, Alabama, Colorado, West Virginia, Mississippi, Wisconsin, North Carolina, Hawaii, Idaho, Georgia, Iowa, Missouri and Tennessee.

[12] People v. Martinez, Sup. Ct. No. A 709321 (L.A. Sup Ct. 1989).

[13] The Polymerase Chain Reaction test, known as PCR, is a technique for amplifying a selected portion of DNA. The test requires considerably less biological material than other DNA tests, and therefore may be useful on samples too small to produce an interpretable result by other techniques.

with DNA from an aborted fetus, and from defendant Wesley for the purpose of matching his DNA with DNA from his bloodstained clothes. Although this hearing was extensive, the Court did not have the benefit of reviewing autoradiographs to compare the underlying theories of the technology with actual test results.

In the second Frye hearing, People v. Lopez, (Sup. Ct. Queens Co. 1988), a case involving allegations of multiple rapes, the trial court allowed the introduction of DNA evidence. While the Lopez court had the benefit of the forensic autoradiographs, the hearing was limited in that the defense called no witnesses in opposition to the introduction of the DNA evidence.

On August 14, 1989, a ruling was issued in the third and by far the most thorough and informative New York State Frye hearing, People v. Castro, (Bronx Co. Ind. 1508/87). The court found that the genetic tests linking the murder suspect to the victim were flawed and, along with the calculation of allele frequencies, scientifically unreliable. The decision, which will likely be viewed as the first serious challenge to forensic DNA testing, was based on a 12-week pretrial hearing filled with extensive testimony by molecular biologists and genetic experts. Although the Castro court found most of the results unreliable in the instant case, it did not question the theories underlying DNA testing, nor did it dispute the ability of the technique to produce reliable results if proper procedures are followed.

Even before the court issued its ruling in Castro, the prosecution admitted that the DNA evidence in the case was not

sufficiently reliable to permit its introduction at trial as evidence of a match. This admission followed a statement by two prosecution experts who joined with defense experts in calling for a study by the National Academy of Sciences "to reach general scientific agreement about appropriate standards for the practice of forensic DNA typing." Further, the validity for forensic application of the key peer review article relied upon by the prosecution in the Wesley and Lopez decisions was seriously challenged when the article's peer reviewer testified in the Castro case. The peer reviewer testified, based on the evidence first revealed at the hearing, that had he known the actual method being used for declaring matches was contrary to the method asserted in the article and had he known that unsubmitted raw data did not support the authors' claims about population genetics, he would not have allowed those representations to remain in the article.

The courts that have applied the Frye standard have generally limited their inquiry to the general acceptance of DNA typing techniques without seriously considering the methodological differences between traditional DNA diagnostics and the forensic application of DNA typing. Most of the Frye hearings have not been vigorously contested by the defense. In many, the defense failed to call a single witness in opposition. This may be due to a perceived lack of scientific resources available in the judicial arena as well as an inability on the

part of many defense attorneys to adequately rise to the challenge of highly technical scientific evidence.

The first appellate decision on the admissibility of forensic DNA typing was Andrews v. Florida, 533 So.2d 841 (1988). Affirming the trial court's decision to admit the DNA evidence, the Florida intermediate appellate court relied on a different legal standard than Frye. In Andrews, as in Lopez, the defense called no witnesses in opposition. Only a few other appellate courts, none of which are in New York, have considered the issue.

Expert testimony is often given considerable weight by juries. When that testimony involves the results of DNA testing, the influence on the jury may be even more substantial than expert testimony on other scientific techniques. It is thus critical that courts have access to the best scientific thinking about forensic DNA techniques and their application in any given situation.

There are several forensic DNA methods currently being used by the few laboratories nationwide that offer forensic DNA analysis services. Although the competing methodologies have elements in common, substantial and significant differences exist in laboratory methods, scientific controls, and techniques for calculating population frequencies. Scientists disagree over the criteria for determining whether or not two samples match; the types and number of probes that should be examined; the control experiments required in forensic testing, where there is frequently no opportunity to repeat the experiment; the

population studies required; and the appropriate formulas for calculating probabilities. Thus, given the lack of consensus within the scientific community, it is likely that in deciding whether to admit DNA evidence, judges will be exposed to a host of differing views from expert witnesses.

In assessing the general acceptance and reliability of the methods used for declaring a DNA match and for calculating the probabilities of a random match, courts could consider the opinions of experts from several scientific fields. With respect to laboratory methods, the fields of molecular biology and genetics are most relevant. Due to the specific problems inherent in evidentiary stains as opposed to fresh blood, the opinions of criminalists and forensic experts could also be considered. On the issue of probabilities and population frequencies, experts in the fields of population genetics, mathematics and statistics can offer useful insights into the techniques that are, as well as those that are not, generally accepted as reliable.

There are many concerns with applying the technology in criminal cases. Forensic DNA typing techniques are new, with the DNA test entering the judicial arena in just the last two years. The history of science demonstrates that a lapse of several years may occur before the scientific community perceives methodological errors in any new scientific technique. The scientific methodologies involved in the forensic application of DNA analysis are evolving; techniques will no doubt change in the

future. It is thus critically important that the judiciary be provided with the most current and informed views on the subject.

Exclusion Versus Inclusion

DNA analysis offers great benefits to prosecutors: A declaration of a match between an evidentiary sample and the suspect's blood can solidify the State's case against the suspect. The benefits to the defense are equally strong: A declaration of a non-match can play a powerful role in exonerating a suspect.

The methodological problems with the currently marketed DNA techniques are particularly germane should they lead to a false inclusion, that is, a finding of a match when in fact no match exists. Many of the methodological problems that arise in determining an inclusion are not present, however, when the test results exclude a suspect. The finding that two samples do not match is considerably more conclusive than the finding of a match.

Concerns about the underlying population data used to calculate the probability of a match do not apply in exclusion. Testing procedures that are conclusive with respect to excluding a suspect are frequently inconclusive with respect to including or identifying a suspect. While inadequate population studies may make it impossible to distinguish one person's DNA from that of all other people, distinctions between a smaller number of people are possible, as has long been the case in simple ABO blood testing and other established identification techniques.

Put differently, a test used to establish identity (inclusion) must distinguish between everyone, whereas a test that yields a different response between two samples (exclusion) must simply be capable of distinguishing between two people.

The justification for treating exclusions and inclusions differently is inherent in our system of justice. Even where test results that exclude a suspect are susceptible to similar methodological concerns as test results that identify or include a suspect, the standard for determining the admissibility of exculpatory evidence is not necessarily the same as that for judging the admissibility of evidence generally. The adversary system is built on the premise that the prosecution bears a heavier burden than the defense.

III. POLICY CONSIDERATIONS

Private Laboratories

Three private companies dominate the market in the sale of forensic DNA typing services: Lifecodes Corporation, Cellmark Diagnostics and Forensic Science Associates. Together, these companies have analyzed samples and provided testimony in dozens of cases across the country.

In theory, there is nothing wrong with private laboratories providing forensic DNA services. Indeed, it can be argued that the pace of development in this area would have been too slow if public funding had been relied upon exclusively, especially since forensic criminal laboratories have never been well-funded, nor do they generally function as centers of research.

While it may be theoretically appropriate to use private laboratories, in practice doing so raises several serious concerns. Questions about the quality of the work being done by the private laboratories have not been satisfactorily answered, and the laboratories' adherence to accepted scientific procedures has not been demonstrated.

Without a careful examination of the quality controls that lie at the heart of private laboratories' DNA typing procedures, it remains unknown whether proper controls are in place for determining if there is sufficient DNA to perform a test, protecting against contamination of probes, deciding if observed patterns come from bacteria as opposed to human DNA, and determining how matches are established.

Private laboratories make sweeping claims of accuracy, stating that the probability of error is one in a million, or in some cases one in a billion. These claims are suspect. While one of the private laboratories recently published an article describing their methods for calculating such probabilities, the basic population data used by laboratories have been seriously questioned by the scientific community. Until the population data are available for thorough review, either by publication or by independent experts, the laboratories' probability claims are subject to criticism.

Private laboratories are reluctant to share information about their procedures, and they have generally adopted a proprietary stance and treated their protocols as trade secrets. At one laboratory, scientists who take the technology transfer training course and the litigants who oppose the admission of DNA typing evidence have been required to sign agreements not to disclose the methods and procedures used by the private laboratory. Yet, the laboratories' scientists claim, as they must under Frye and most of its progeny, that their techniques are generally accepted as reliable in the scientific community. It is difficult to reconcile the practice of cloaking a methodology in secrecy with the claim that the methodology is widely accepted. Until private laboratories allow their procedures to be reviewed by the general scientific community, it will remain impossible to evaluate their merits.

The adversary system does not always respond rapidly to new scientific techniques. Courts have occasionally embraced new scientific techniques only to find out later that incorrect identifications (false positives) were possible, despite claims that the technique would either be foolproof or yield no result. This was the fate, for example, of the paraffin test and certain techniques used to determine the presence of narcotics in hair samples.

In regulating private drug companies, the Food and Drug Administration uses a system of blind trial testing. State agencies and professional organizations have laboratory standards and systems for blind trial testing of AIDS testing facilities, blood banks, and laboratories that do other forms of testing for medical treatments. DNA typing for forensic purposes is so new that no such standards or testing procedures have been developed, and few serious proficiency or blind trial tests have been conducted. One test that was conducted, however, produced disturbing results.

In a proficiency study conducted in California by the Orange County Sheriff's Department crime laboratory,[14] two of the three private laboratories made an error in analyzing samples. One company was wrong in one of the forty-four matches it identified, another was wrong in one of fifty matches, and only the third company was correct in all of its matches. These results fall

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[14] As reported by Mark Thompson in the April 3, 1989 issue of The New Republic.

far short of the private laboratories' claims of absolute certainty of forensic DNA testing. Furthermore, the laboratories made the mistakes knowing that their results would be scrutinized carefully.

It is important that law enforcement officials, jurists and policy makers examine critically the position generally advanced by the private laboratories that DNA typing procedures for forensics have already been perfected; that current typing procedures generate probabilities of error of less than one in a billion; and that they are foolproof -- you either get the right result, or no result, but never a false positive.

Public Laboratories

Like the private laboratories, public laboratories should follow scientifically accepted principles and procedures when conducting forensic DNA analysis.

Most forensic analysis in New York State is conducted in the fourteen forensic laboratories operated by federal, state, county and local governments: the Federal Drug Enforcement Administration Laboratory in New York City; the four laboratories operated by the New York State Police, located in Albany, Newburgh, Binghamton and Olean; the laboratories operated by the counties of Erie, Monroe, Nassau, Niagara, Suffolk and Westchester; and the laboratories operated by the cities of New York, Syracuse and Yonkers. Twelve of these laboratories conduct serological examinations on physical evidence; serological tests are not conducted by the Drug Enforcement Administration, whose

efforts are devoted exclusively to drugs, and the City of Yonkers, which forwards evidence of this type to the Westchester County Laboratory. Larger counties and the major metropolitan areas of the State also analyze forensic evidence in their medical examiner's laboratories.

The application of DNA to criminal investigations is at various stages of development in New York State's public laboratories. For example, the Nassau County Police Department has trained analysts, purchased equipment and recently begun testing forensic samples; the Nassau County Medical Examiner's Office has also begun training staff for DNA analysis. Suffolk County has received equipment funding and is sending its scientists to the Federal Bureau of Investigation's (FBI) training program. Erie County and Niagara County are working together to apply the technology to physical evidence within their region. Except for the laboratory in Monroe County, the rest of the laboratories in New York State, as well as the New York City Medical Examiner's Office, are planning on implementing forensic DNA analysis in the future.

After two years of study, the FBI opened a forensic DNA laboratory in October 1988. Thus far, the laboratory has analyzed samples from approximately three hundred cases, of which several were submitted from New York State. The FBI is also providing training in DNA analysis techniques for state and local laboratory personnel.

State and local jurisdictions across the country have undertaken extensive efforts to implement DNA technology. California, Virginia, North Carolina, Maryland and Florida have either begun DNA testing or are planning to do so shortly; many other states have requested funding to implement a forensic DNA system. Internationally, several European countries are developing the technology.

While the number of New York cases thus far submitted for analysis is relatively small, it is anticipated that the need for such services will grow rapidly in the coming years. As the demand for service increases, and as localities respond by creating their own DNA analysis capabilities or sending more and more cases to private laboratories, the urgency of developing Statewide guidelines and standards is manifest. Without such uniform standards, the reliability of the forensic techniques will remain suspect, and the full potential of this promising criminal justice tool will not be realized.

Computerizing and Standardizing Genetic Information

Population Studies

As mentioned earlier in this report, the population studies that are currently used to calculate the likelihood that a DNA match could arise by chance, that is, occur at random in the population, are based on relatively small samplings. Larger numbers of observations on well-defined populations are needed. The Panel recommends that all data generated by the DNA analysis network, which is described later in this report, be kept in a

format that will allow the generation of local population statistics.

Since allele distribution can vary considerably among racial and ethnic populations and sub-populations, as well as by geographical region, it is important that population statistics used in New York reflect this State's population structure. The population data would be collected for the sole purpose of validating population statistics. The data would not contain information traceable to an individual.

With the exception of the FBI, which has begun to develop its own population statistics, the existing allele frequency data for probes of forensic identification purposes are largely held by private companies, which maintain a proprietary interest in that information. Moreover, allele frequency data are valid only for the probe/enzyme combinations used to generate that data. The information is not transferable to other probe/enzyme combinations. Since the field of forensic DNA analysis is changing rapidly, New York may choose to use technology different from that used currently by the private laboratories. Population statistics consistent with New York's selected probe/enzyme combinations would then have to be acquired. The Panel thus recommends that New York create its own population statistics. To assist in this effort to broaden and better validate population statistics, New York should use compatible data generated by others where possible.

DNA Databanking

The creation of computerized files containing investigative support data to assist law enforcement officials in solving crimes raises issues that are far more controversial than those raised by the collection of population statistical data. There are many serious privacy concerns that must be overcome before a DNA databank of coded DNA prints from designated offenders should be established. If these privacy concerns are scrupulously satisfied through legislation and regulation, the Panel recommends that legislation be enacted mandating that all persons convicted of violent sex crimes or other designated offenses be required to give specimens of their DNA to an authorized agency. To implement this databank, the Panel further recommends that New York State begin the preliminary developmental work needed to overcome the technical problems inherent in building such a databank.

Proponents argue that databanking is an appropriate law enforcement tool that would be especially helpful in solving serial crimes and other crimes where there is a high rate of recidivism. Opponents, on the other hand, fear an abusive intrusion into one of the most fundamental privacy concerns - a citizen's genetic makeup. Genetic information, if not scrupulously secured, could conceivably be used to read an enormous array of information from a person's genes, information that people have a right to believe will remain confidential. For instance, employers, insurers and other non-law enforcement

personnel could use information on familial relationships, genetic predispositions to certain diseases, or genetic deficiencies that perhaps indicate a propensity toward violent or antisocial behavior.

These critical privacy concerns are far from abstract. The eugenics movement in this country, which resulted in thousands of involuntary sterilizations, the suggested screening of violent men for an extra Y chromosome, the sickle cell screening tests employed to prohibit marriages, and the current privacy concerns over HIV screening, underlie the Panel's following recommendation: Use of a databank for other than law enforcement suspect identification purposes should be expressly prohibited and subject the abuser to criminal penalties.

The theory underlying a criminal investigation databank is straightforward: By preserving a DNA code in a computer, society will improve its ability to identify suspects in certain types of crime - particularly rape and other sexual assaults. Much like the way in which computerized fingerprint systems are used to examine latent fingerprints found at crime scenes, DNA extracted from an evidentiary sample could be matched against DNA coded information stored in a database.

The first step in building a DNA databank is the collection of DNA samples taken from designated offenders. These samples would then be coded on a computer. The DNA "print" itself would not be computerized, only the identification data obtained from the coding of that print would be maintained in the computer

file. The process would begin when a sample of DNA collected from a crime scene was analyzed at a DNA laboratory; the laboratory would then develop a code for the DNA found at the crime scene; thereafter, the code would be entered into the database and searched against all of the codes contained in the database; if a matching code was found in the database, the existence of the match could be used to identify a possible suspect.

The technological issues inherent in creating a DNA databank may be substantial. Once these issues are resolved, the identification information generated from the samples taken from convicted violent sex offenders or other designated offenders would be computerized along with pertinent demographic information, such as name, address, date of birth and criminal history. The potential for abuse of this type of information is minimal.

To avoid the improper use of the underlying DNA sample, the Panel recommends that the actual DNA sample itself not be saved. The only information that would be retained is the computerized coding of the identification and demographic data contained in the databank. This will ensure that the information never be used to identify genetic predispositions. Furthermore, in the event that a conviction for a particular enumerated crime that gave rise to the taking of the DNA sample is reversed or otherwise terminated in favor of the subject as defined by Criminal Procedure Law, Section 160.50 (2), the computer's soft

copy as well as any hard copies in circulation should be destroyed.

The Panel recommends stringent rules governing the use of a computerized match. If the computer makes a DNA match, the information would be transmitted to the investigating authorities who could use it, along with other investigative tools, to determine if reasonable cause exists to further pursue the identified suspect. While it is ultimately for the courts to decide whether an arrest can be made based solely on information contained in the databank, the Panel recommends that, because of the infancy of the technology and all of the problems enumerated in this report, that the DNA match should not be the sole basis for making an arrest. We recommend that a computer generated DNA match be used only to provide the legal justification for questioning a suspect or securing a court ordered line-up, search warrant, fingerprint, or extraction of samples of physical evidence from the suspect. Additionally, if a search of the DNA databank reveals a "hit" on an evidentiary sample taken from a crime scene, a court order could be obtained to take a fresh DNA sample from the suspect. Making a second, new DNA comparison could cure many of the technical and scientific challenges to the accuracy and reliability of the older DNA code lodged in the computer.

Standardization

Although with the appropriate privacy safeguards in place we recommend the collection of DNA samples from the targeted

population, there are numerous technical obstacles that need to be overcome before computerization commences. As noted above in relation to computerizing population statistics, computer codes used to create databanks for DNA information on designated offenders are not transferable from one probe/enzyme system to another system.

Currently, two major private forensic DNA laboratories and the FBI employ three different and hence non-transferable probe/enzyme systems. The differences are exacerbated by the use of different equipment to size DNA fragments (e.g., digitizing bit pad vs. video camera image processing), different electrophoresis gels, and various sizing standards. Furthermore, testing technologies are under rapid development, with new probes and new methods for analysis becoming available regularly. Thus to be cost effective, flexibility will have to be built into any computer system developed by the State. Since dissimilar information cannot be compared, serious consideration should be given to establishing national standards for all testing procedures, analysis, interpretation, and coding of data, including the standardization of sizing techniques. The creation of national standards would enable one state to search the databases of every other jurisdiction. Further, by establishing national standards against which to measure laboratories performances, the important goal of ensuring that appropriate quality controls are observed by laboratories would be furthered.

In recommending that databanking be conducted in the manner outlined above, the Panel believes that, with appropriate legislative safeguards, the compelling privacy concerns can be addressed. The Panel believes that its recommendations strike an appropriate balance between competing privacy and legitimate law enforcement interests.

IV. A MODEL DNA ANALYSIS SYSTEM

Regional Laboratory System

The Panel recommends the creation of a Statewide DNA laboratory network, with forensic DNA analysis services provided by region. At least three regional locations should be established. Region one would cover New York City and Long Island; region two would extend from New York City through the Hudson Valley and central and northern New York; and region three would cover Western New York. These regions could be further subdivided later if workloads dictate.

The Panel recommends that DNA testing be equally available to defense and prosecution. Justice demands that any technique with the power to include or exclude a suspect with a high degree of certainty be made available to all parties.

Costs associated with the regional system should be apportioned by some mechanism other than on a per-case basis. Decisions on whether DNA analysis will be applied in a given case should be made on the merits of the case, not on whether there is sufficient money in the budget to pay for the analysis. By spreading costs over a wide population base, no jurisdiction would be denied access to this potentially critical evidence purely on economic grounds.

In the absence of national standards, the Statewide DNA laboratory network would coordinate quality assurance and quality control for all laboratories in the network. The importance of these functions cannot be overestimated, and everyday caseload

pressures should not be permitted to compromise quality control procedures or system-wide quality assurance safeguards. Further, the scientists in the network should keep abreast of current developments in this rapidly changing area; this critical function would require several full-time staff and a part-time commitment from others.

The Panel recommends the accreditation of DNA laboratories (see page 46). Among other requirements, to be accredited each local public or private laboratory that performs forensic serology and intends to perform DNA testing must maintain at least one analyst certified by the DNA Analysis Network as qualified to examine, purify and isolate genetic material from forensic case materials. This person should also be trained to perform initial screening tests on isolated DNA to establish suitability, that is, sufficient quality and quantity, of genetic material for further DNA testing.

Training

The regional DNA laboratories should provide training for local law enforcement personnel, other forensic medical and laboratory personnel, prosecutors, defense attorneys and judges. Although the training for each group would focus on different issues, the underlying aim of the training would be to improve the collection and preservation of evidence and to instruct users on how to interpret, evaluate and present the DNA results. The training would be coordinated on a statewide basis to ensure consistency and high standards.

Further training should be conducted by integrating issues related to DNA analysis into on-going training programs, such as the training program for law enforcement officials conducted by the Bureau of Municipal Police at the Division of Criminal Justice Services. DNA techniques do not require a change in the way crime scene evidence is handled, although the preciseness and importance of the technique magnifies the impact of improperly handled evidence. Control of all crime scenes should be strict and access should be severely limited. By adhering to established crime scene guidelines, a high level of integrity of the physical evidence will be maintained.

Role of Local Laboratories

All evidence should be examined initially by a local crime laboratory using traditional forensic techniques before being sent for DNA analysis. Not all biological samples are appropriate for DNA testing, and this new method should not be viewed as an automatic substitute for the forensic methods now used in crime laboratories.

DNA testing procedures often consume the sample, and it cannot thereafter be used for traditional forensic testing. By requiring that all case materials with potential for DNA analysis be submitted in the first instance to a local crime laboratory for preliminary evaluation before submission to the regional DNA laboratory, it is less likely that other valuable forensic evidence will be overlooked. This is essential because the

practical difficulties with the tests ensure that a proportion of DNA typing tests will be inconclusive.

In considering whether to submit a sample for DNA analysis, the local laboratory should consider the probative value and the size and condition of the evidence. This initial evaluation will often reveal that traditional forensic testing is sufficient, and that there is no need for DNA testing in a particular case.

Requiring that local laboratories continue to conduct the classic serological tests will also ensure that funds allocated to DNA typing are used for that purpose exclusively. If they are assured that the local crime laboratory personnel performed the appropriate tests before shipping the sample, scientists working in DNA laboratories can concentrate their energies on DNA testing without concern for other procedures.

Advisory Committee

DNA technology is expensive, and its very power makes abuse a serious concern. Therefore, there should be a systematic method to ensure that DNA technology is applied only in appropriate circumstances following established scientific guidelines. The Panel recommends the establishment of an Advisory Committee, which would establish such guidelines.

The guidelines developed by the Advisory Committee would include general standards and appropriate documented procedures to be followed in all cases. The guidelines would not be case specific or in any way designed to tell either side how to proceed with their criminal case.

The Advisory Committee would be made of representatives from law enforcement, forensic science, prosecution and defense, and the judiciary.

Scientific Review Board

The admissibility of DNA analysis procedures for forensic applications is being evaluated in courts throughout the state. Each time a case is presented that involves this technology, a new Frye hearing is being conducted. Courts' ability to efficiently and fairly evaluate the technique would be vastly improved if an impartial scientific board existed to screen all of the available technologies and methodologies.

The Panel recommends the establishment of a Scientific Review Board, distinct from the Advisory Committee, that would set essential minimum scientific controls and examine the scientific standing of a test for DNA typing. Approval of the Review Board would be necessary before the test system could be used in New York State for forensic purposes. If new scientific information indicates that a previously approved procedure should be upgraded, the Board could reassess its prior approval.

A major criteria in determining whether a new form of scientific evidence should be admitted in court is whether the principles underlying the new test and techniques have gained general acceptance in the relevant scientific community. In making this determination, courts generally consider whether the technique in question has been published in peer review journals. In the case of DNA analytical techniques used in forensic work,

peer review journals may be an inappropriate and unrealistic measure for two basic reasons.

First, acceptance by a peer review journal in human genetics might not constitute an appropriate review. While such a review should be competent to judge the quality of the molecular biology and the population studies, there are other considerations that may determine if the new development is suitable for application in the forensic laboratory. These considerations might include the ease with which the different sized DNA fragments can be distinguished, or whether the new development involves significant changes in procedure that require a higher level of laboratory skill.

Second, a publication, peer review standard would often be difficult to enforce as most journals would not be interested in publishing information about new probes and enzymes, or about the results of the population studies. These issues, while germane to forensic DNA analysis, are not generally considered new and innovative enough to warrant publication in peer review journals. While it may be possible to find a journal that will publish the results of such work, the quality of the peer review of that journal may be unsatisfactory.

The Panel recommends that the Scientific Review Board assume some of the functions traditionally performed by publications and peer reviews. The Board would act as an expert and impartial adviser to the courts. While the Board's conclusions could, of course, be challenged by the prosecution or the defense, their

expert views should nevertheless help judges faced with the difficult task of determining the scientific validity of a DNA test being introduced into court.

The Scientific Review Board would assess the scientific accuracy and the potential forensic use of each DNA typing test being proposed for introduction in court. The Board would review all published materials on the submitted test, and the laboratory submitting the test would be expected to supply to the Board any relevant unpublished data or documentary evidence. The laboratory would be required to submit a written description of critical aspects of its tests, including information on the probes used in the analysis and the polymorphisms detected by the probes in combination with restriction enzymes. The data used to derive the allele frequencies for these polymorphisms in different populations must be available, and the calculations used to estimate allele frequencies must be justified.

The laboratory would be required to justify and validate any changes in procedure or any unusual features of the proposed analysis. Prior to granting its approval, the Board could require a practical demonstration by an independent laboratory of the utility of the proposed analysis.

The Scientific Review Board should be composed of not more than five members, selected as follows: two population geneticists competent to assess such matters as the validity of the population studies used to determine allele frequency and the calculations derived from these frequencies; a molecular

biologist with experience in using similar techniques in a medical DNA diagnostics laboratory; a forensic scientist with experience in using similar techniques in a forensic science laboratory; and a chairperson with practical experience in molecular genetics who is aware of the broader implications of the use of these techniques in forensic science.

Accreditation

Basic Operating Standards

As part of the model DNA network, a state accreditation process should be developed to monitor public and private laboratories providing forensic DNA analysis services in New York State. At a minimum, to be accredited, laboratories would adhere to the following operating standards.

To be accredited, public and private laboratories providing DNA analysis for civil or criminal cases in New York State should fully document their methods and maintain careful quality assurance records. New methods should be fully evaluated and tested before introduction. Validation should meet rigorous scientific standards and be verifiable by qualified outside experts. All methods should have been validated on forensic samples, and such studies should be available for examination.

The laboratory should be thoroughly equipped for molecular biology techniques. Each DNA laboratory should be a secure facility with examination areas closed to unauthorized personnel. Confidentiality of all records should be maintained. Each

laboratory should also have secure long term cold storage capability.

As part of the accreditation process, laboratories would be required to demonstrate their proficiency in genetic profiling by participating in state or national proficiency testing programs that include both known and blind tests. The regional DNA laboratories would subscribe to the same quality assurance programs and frequently exchange materials to ensure the uniform quality of service throughout the State.

Accreditation would require that the technical supervisor of each DNA laboratory be a doctoral-level scientist experienced in molecular biology, or that a person with such a background was available to the supervisor on a consultant basis. In addition to technical control of the facility, the supervisor would decide the suitability of any case submitted for forensic DNA analysis. Technical personnel should be trained in molecular genetic techniques and should have at least a year's experience before being allowed to handle case materials without direct supervision.

Validation Procedures

Several different technologies and methodologies are currently being used in forensic DNA analysis. The validation of one procedure does not necessarily imply that others are equally valid. Each technique contains an inherent potential for error, as do the population studies that are the basis for calculating the significance of a finding that a suspect's DNA matches

evidence recovered from a crime scene. Thus, each technique should be screened through a validation procedure.

Validation procedures are commonly used in the health profession to screen new clinical tests for use in medicine. For example, the Federal Drug Administration commonly reviews new diagnostic procedures, such as new kits and devices to test for viral or bacterial infections. Since a faulty forensic DNA analysis system can have equally dire consequences as a faulty clinical test, the same sort of assurances that are used in the health profession should be used with DNA technology.

Probes must have been fully described in the scientific literature or approved by the Scientific Review Board. Information on the allelic frequencies in different populations must be fully documented. Data on alleles must be sufficient to calculate the statistical significance of a match given the underlying population.

Information on the influence of the forensic environment on the typing method and the allelic polymorphisms for each probe system must have been published in the scientific literature or approved by the Scientific Review Board.

Scientific test procedures are valid only when conducted in a properly controlled fashion by experienced technicians and scientists. DNA analysis techniques used to identify potential criminals should be no exception. The Panel recommends an extremely strong commitment to quality assurance for forensic DNA analysis.

Admissibility in Court

To support admissibility in court the following factors must be present:

1. The public or private laboratory must be accredited and its technology approved by the Scientific Review Board.
2. All necessary documentation to establish the quality of the DNA sample and the validity of the testing procedure must be available for examination.
3. All notes, charts, exhibits, etc., necessary to support and document the conclusions reached must be open to examination.

Financing the Model System

The Forensic DNA Analysis Panel is aware of the State's current shortfall in revenues. Consequently, a variety of options for funding the DNA network should be considered.

The cost of the new system could be funded entirely by the State or by local governments; federal funds could also be pursued. It would be preferable, however, if the costs were shared by the State and the localities, with the funding formula based on population, level of criminal activity, or other relevant measures.

The regional laboratory system should be developed in stages. During the initial stage, the Advisory Committee and the Scientific Review Board would be established and their policies formulated. Thereafter, an initial regional laboratory would be created. The lessons learned in establishing the first

laboratory would be valuable in developing the other regional laboratories.

First-phase funding requirements for the network will be less than $50,000. The initial costs will be limited primarily to financing the work of the Advisory Committee and the Scientific Review Board's meetings and training sessions. Second-phase costs will be limited to the cost of a single laboratory, with the remaining two laboratories to be established in subsequent years as necessary to meet the demand for this service.

Additional expenses will be incurred in establishing a DNA databank. In anticipation of the resolution of the privacy concerns discussed in the databanking section of this report, one or more persons with technical expertise should be hired to begin addressing the many technical issues involved in creating such a computerized capability.

A more detailed description of cost estimates is presented in Appendix III of this report.

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Appendix II - TECHNICAL APPENDIX

DNA

An appreciation of the structure and behavior of the DNA molecule is important in understanding DNA typing. The essentials of the DNA structure are:

- The DNA molecule is composed of two chains, made up of small molecules called nucleotides. Each nucleotide comprises a base, a sugar molecule and a phosphate group. The nucleotides are linked together through their phosphate groups with chemical bonds called phosphodiester bridges.
- There are four bases - adenine, guanine, thymine and cytosine.
- The two chains are held together by interactions between the nucleotides on the opposite chains, and the chains are twisted to form a double helix.
- The interactions between bases are such that the adenine of one chain is always paired with a thymidine in the other chain, and a guanidine is always paired with a cytosine.
- It is the order of the bases along the chain that constitutes the genetic code, and the cell has a very complex machinery for translating this code and using it to synthesize proteins.

The essential feature of the DNA double helix that underlies all manipulations of DNA is the complementary base pairing

between the chains. The two chains of the helix can be separated by a variety of means, and under appropriate conditions the two separated chains will come together (hybridize) and reconstitute exactly the same molecule. Similarly, a small segment of DNA will find its complementary sequence. Such small segments are called probes, and the accuracy of the hybridization process is such that a DNA probe only nineteen nucleotides long will find its exact complement in the whole of the human genome of 3×10^9 nucleotides.

Restriction Fragment Length Polymorphisms (RFLPs)

The type of DNA variation between individuals that is exploited for DNA typing is called restriction fragment length polymorphism (RFLP). Restriction endonucleases are bacterial enzymes that cut DNA molecules. DNA is not cut at random, rather each enzyme cuts the DNA strand at a particular sequence of base pairs - its recognition site - unique for each enzyme. If a single base pair in the recognition site is changed, the enzyme fails to cut. Changes of this nature are very common in the human genome; they differ between individuals and are inherited just like genes.

When DNA from a person is treated with a restriction endonuclease ("digested" in the jargon of the molecular geneticist), many millions of fragments are produced. If a DNA probe is available, the probe will hybridize only to the fragment with the complementary sequence to that probe, and if the probe is labelled with radioactivity, the fragment can be detected.

Suppose the probe hybridizes to a fragment 4500 base pairs long in one individual. There may be a polymorphic site for the restriction enzyme within this 4500 base pair fragment, and another individual may have that site. In this case, the enzyme will produce fragments of 1,500 base pairs and 3,000 base pairs, and depending on where the probe hybridizes in relation to the polymorphic site, one or two fragments will be detected.

Variable Number Tandem Repeat Loci (VNTR)

There is a special type of RFLP where the polymorphism is due not to the presence or absence of a restriction enzyme site, but rather to the variability in the distance between sites. Variable number tandem repeat regions (VNTR) are regions of DNA that are made up of identical units ("repeats") joined together like links in a chain. The numbers of repeats can vary widely between different individuals, and it is this variability that is exploited in forensic DNA typing. A probe to a VNTR locus detects bands that vary in size depending on the number of repeats present.

Two types of probe have been used. Alex Jeffreys developed the first of these type of probes, one that detects a large number of VNTR loci. The patterns of bands produced by this probe are very complicated. This disadvantage outweighs the advantage of their ability to detect extreme individual variability. Consequently, there has been a move to use probes that detect variations at a single VNTR locus. Using such probes still results in a great deal of variability at a VNTR locus, but

the pattern of bands is simpler. The power of the typing comes from examining several VNTR loci, each with a different probe, and combining the data obtained from all loci.

Performing DNA Typing

The techniques used for DNA typing are theoretically simple and require little in the way of sophisticated equipment. Nevertheless, this simplicity is deceptive because many steps are involved in the whole process. Reliable implementation requires rigorous controls. Inconclusive results and possibly false positives could be obtained if any of these steps are performed incorrectly.

Preparing DNA: DNA is first isolated from the evidentiary sample and purified using a combination of chemical methods. A small sample should be electrophoresed to check the quality of the DNA, and the amount of DNA should be measured with a fluorimeter. A control sample of high quality DNA should be processed in parallel to ensure that all stages of the procedure are working satisfactorily.

Restriction Enzymes: It is essential to have pure DNA because the next step - treating the DNA with a restriction endonuclease - may fail if impure DNA is used. The enzyme may not cut the DNA strands at all the available sites, resulting in an incomplete or partial digestion. Alternatively, the impurities may result in the DNA being totally destroyed. Following digestion with the enzyme, a small sample of the reaction mixture must be electrophoresed on a gel and stained

with ethidium bromide, a chemical that stains DNA. Properly digested DNA produces a characteristic picture, and partial digests and DNA degradation can also be detected at this stage. The test gels must be photographed, labelled and preserved in the laboratory records for the case.

Electrophoresis: Assuming the procedure is working well, the differing sized DNA fragments resulting from the action of the restriction enzyme must be separated by electrophoresis in an agarose gel. It is important to use the same amount of DNA and the same solutions for all the samples on a gel because these factors will alter the movement of the DNA fragments in the gel. It is also essential to include appropriate controls. These must include samples containing radioactive DNA fragments of known sizes that can be used for calibration. Samples of human DNA known to produce satisfactory data are used to control for subsequent stages. Evidentiary and suspect samples should be in adjacent lanes of the gel so that comparisons can easily be made. These gels must be photographed, labelled and preserved in the laboratory records for the case. Other controls may also be necessary to ensure that the DNA has migrated properly and that artifacts do not appear.

Southern Blotting: An agarose gel cannot be handled. Therefore, the DNA must be transferred to a more robust material. The preferred material is a sheet of positively charged nylon. An exact replica of the distribution of DNA in the gel is produced by overlaying the gel with the nylon sheet (called a

membrane or filter) and allowing capillary action to carry the DNA fragments from the gel onto the nylon where they become bound. This procedure is called Southern blotting or transfer. As a control, it is essential to check that the DNA has been transferred from the gel to the filter by restaining the gel with ethidium bromide and determining that no DNA remains in the gel. These gels must be photographed, labelled and preserved in the laboratory records for the case.

DNA Probes: The DNA probes used to detect the polymorphic fragments on the filter must be carefully prepared. The probes are small segments of DNA usually cloned into larger circular pieces of DNA called plasmids. Plasmids are able to replicate themselves inside bacteria, and they have to be isolated from the bacteria before they can be used. It is preferable to isolate the cloned probe segments from the plasmid DNA, but in any case a small sample of the probe should be run on a gel to check its purity. These gels must be photographed, labelled and preserved in the laboratory records for the case. The probe must be made radioactive. Before using the labelled probe on evidentiary samples, its quality must be checked by calculating its specific activity and by carrying out a test hybridization.

Hybridization: The polymorphic DNA fragments are detected by hybridizing the radioactive probe with the filter. The probe hybridizes to just the fragments with its complementary sequence out of all the millions of fragments on the filter. The filters are washed under very carefully defined conditions of temperature

and salt concentration to remove non-hybridized probe. The stringency of this washing is very important to avoid non-specific binding of the probe. With experience, adequate washing can be crudely determined by using a Geiger Counter.

Autoradiography: Following washing, the filters are dried and sandwiched with an X-ray film. The radioactively labelled fragments expose the X-ray film and reveal their exact position. After an appropriate length of time, the film is developed. This is the critical stage for the most stringent quality control. The autoradiograph will show whether the whole procedure has been performed properly. It is essential that the film be reviewed by several people to determine if it is adequate for interpretation. In forensic applications as in medical genetics, sub-optimal autoradiographs must be rejected and not interpreted. The size of a fragment on the film is determined by measuring how far the band has moved along the gel. Small fragments move longer distances than large fragments. The position of bands on the autoradiographs must be determined, although the way in which this should be done varies substantially from laboratory to laboratory.

Re-Probing: The filter must then be treated to remove the radioactive probe so that the filter can be hybridized with a second probe to detect another polymorphism. Stripping the probe must be done carefully or else the DNA bound to the filter may be removed. Following stripping and before hybridization, the film should be exposed to X-ray film to ensure that all the previous

probes have been removed. Otherwise, confusion will arise if fragments labelled by two different probes appear on the same autoradiograph.

Record-Keeping: It will be clear from this brief description that the procedure is complex and there are many points at which things may go wrong. It is essential that complete records be kept of all laboratory procedures for each step in each case. All data must be kept whether the particular step was a success or failure. All reasons for modifying a procedure must be recorded.

Problems with Laboratory Procedures

There are several unique methodological problems associated with DNA analysis for forensic use:

Probes: The Variable Number Tandem Repeat (VNTR) probe is commonly used in forensic DNA analyses. In contrast to most probes used in clinical applications, the VNTR recognizes a continuum of band sizes rather than discrete bands. Thus, discrimination between alleles is difficult at best. To use these probes for forensic purposes, most laboratories group these bands representing alleles into bins that contain a short range of sizes. Currently there is no consensus among the forensic community or among the laboratories performing these tests on how large these bins should be; the size of the bin, however, influences calculations of the probability and the determination of whether any two individuals' DNA match or does not match. Moreover, there is some disagreement about the appropriate

methodology for measuring band size. Most laboratories use a digitizer to measure band sizes; however, at least one laboratory may be relying solely on visual observation for evaluating a match.

Artifacts that affect DNA migration: There are several artifacts that affect DNA migration through a gel. Since the degree of migration is used as a measure of the size of the DNA fragment, it is critically important to determine whether there is any band shifting due to various environmental conditions such as heat, contaminants in the sample, unevenness in the gelling procedure, unevenness in the position of the electrodes, bacterial contamination, etc.

Two methods are currently being proposed to evaluate this situation. The first uses nonpolymorphic probes of various sizes to determine the degree of band shifting. If the nonpolymorphic probe recognizes the bands at the same position in all lanes, it can be assumed that no band shifting has occurred. If band shifting is observed, however, it may be difficult to determine if there is a match or a non-match since band shifting is often not uniform.

The second method is to mix the unknown sample with that of the suspect. If the two samples are identical, they will migrate to the exact same location. If they are not identical, they will most likely separate depending on the resolution of the gel system.

Both methods are valid; however, the mixing system requires enough DNA for a second sample, which is often unavailable in forensic cases.

Quality of DNA: Because of the nature of the forensic sample, the DNA may often degrade, lessening its quality. This makes DNA analysis more difficult, especially when the probe used detects higher molecular weight fragments. To avoid this problem, laboratories are screening their sample DNAs prior to analysis to determine if they are suitable for the Southern blotting technique. Unfortunately, these screening systems are not entirely successful at determining the degradation of the human-part of the DNA samples since they also display bacterial DNA. The use of nonpolymorphic human probes that detect high molecular weight human DNA bands of comparable sensitivity has been proposed as one solution.

Quantity of DNA: Sample sizes are often small and inadequate for suitable analysis. In certain cases, the bands present in the evidentiary lane are on the borderline of resolution by visual or mechanical means. Moreover, often the test cannot be repeated for confirmation due to the limitations of the sample. Interpretations are consequently difficult. Sometimes a longer exposure of the gel to the X-ray film can resolve the bands that are difficult to see. There is a sensitivity limit, however, that cannot be corrected by any length of exposure.

Some laboratories are developing new techniques that work with smaller samples. Based on a new procedure called the polymerase chain reaction, these techniques are now being used in paternity exclusion cases and in some forensic cases. They are quite different from the DNA analysis based on the Southern blotting technique and may have an entirely different set of methodological problems. Forensic scientists should consider saving a small amount of any evidentiary sample for possible future use with this new technology.

Quality control: There are no widely accepted criteria for quality control or proficiency testing in DNA analysis of forensic samples. It is consequently unclear whether forensic laboratories use appropriate quality control and assurance techniques. If not, the laboratories' results are suspect. For example, if samples are mislabelled, contaminated, or used incorrectly, different DNA band sizes or additional DNA band sizes could be identified.

To remedy this problem, the FBI runs a known human tissue sample at the same time as the evidentiary sample. If the results with the known sample are incorrect, the data obtained from the evidentiary sample is disregarded.

Another way, used by the forensic as well as the clinical and medical communities, to ensure quality control is to insist that each laboratory performing such tests be evaluated periodically by proficiency testing techniques - preferably blind proficiency testing techniques. These techniques involve the

shipment of known samples that are similar to the ones the laboratory would normally receive. The laboratory then evaluates these samples under the same conditions and with the same personnel as they use for forensic samples. Their results could later be compared with results of other laboratories receiving the same samples. These tests should be blind, that is, the laboratory should not know whether the samples were test samples or actual forensic case samples.

Population genetics: Population studies are an integral part of any forensic DNA analysis. Without a knowledge of the frequencies of certain alleles as represented by DNA band size in a population, it is impossible to predict the probability of a match or a non-match. While several laboratories are now performing more population studies, only one population study from one private company has so far been published in a peer-reviewed journal, and this study has been seriously challenged by its own peer reviewer.

There are several problems with the population studies being conducted. The statistics used in other population studies with single-copy probes to analyze genes with a low degree of polymorphism may not be applicable to forensic studies that employ a highly polymorphic VNTR probe. There is very little information on this subject, and it is thus difficult to evaluate

the methodology. Disagreement exists over the size of the population bases needed to accurately forecast DNA band size frequencies. Moreover, frequencies may vary by ethnicity or by subpopulations within the larger racial or ethnic population.

APPENDIX III: FINANCING THE DNA NETWORK

This report calls for the eventual establishment of three regional laboratories, one of which will be located in New York City, where rent and other costs may be higher than in other areas of the State. While the staffing patterns will probably vary between the laboratories, our cost estimates are based on an equal distribution of resources between the regions. The Advisory Committee will determine the final allocation of resources among the regions.

The estimates include several distinct categories: personal service, with each laboratory staffed with a highly-skilled and experienced supervising scientist, two serologists, two technicians and one stenographer; equipment, which in many cases will involve one-time only start-up costs; rent, although it may be possible to find space for one or more of the laboratories at low or no cost; reagents and supplies; training; administrative costs; and travel and other non-personal services expenses.

In deriving our cost estimates, we considered the experience of other jurisdictions.

ESTIMATED ANNUALIZED EXPENSES
PER DNA LABORATORY

Personal Services:

1 Supervisor	SG-25 =	$ 47,000
2 Serologists	SG-20 =	72,000
2 Lab Technicians	SG-12 =	47,000
1 Stenographer	SG-09 =	20,000
Total Personal Service		$186,000

Non-Personal Services:

Equipment:	$90,000
Supplies & Reagents:	60,000
Training:	30,000
Rent:	30,000
Administrative:	50,000
Miscellaneous:	10,000
Total Non-Personal Services	$270,000
TOTAL PER LAB:	$456,000
3 REGIONAL LABS:	$1,368,000

These estimates are for full-year funding once the three regional laboratories are fully operational. First year funding requirements will be minimal, probably less than $50,000. The initial costs will be limited primarily to financing the cost of the Advisory Committee and Scientific Review Board's meetings and training sessions. Second year costs will be limited to the cost of a single laboratory, with remaining laboratories established in subsequent years.

Additional costs will be incurred in establishing DNA databanking capabilities. At this time, in anticipation of the resolution of the privacy concerns addressed in this report, the

State should make at least a minimal investment by beginning to address some of the technological issues inherent in creating a DNA databank.

EXHIBIT B2

SPECIAL ALERT

NEW YORK'S DNA DATA BANK AND COMMISSION ON FORENSIC SCIENCE

An analysis of Chapter 737 of the Laws of 1994, including the complete text of the new statutory provisions

Matthew Bender

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November 1994

Dear Subscriber:

On August 2, 1994, Chapter 737 of the Laws of 1994 became effective. Chapter 737 provides for the establishment of a DNA identification index and a commission on forensic science. Because of the significance of this new law, we thought it was important to provide you with a special discussion of its details.

This **complimentary** pamphlet provides the full text of Chapter 737 together with a comprehensive analysis prepared by George H. Barber, Esq., Chief of Appeals for the Albany County District Attorney's Office, and Professor Mira Gur-Arie, Assistant Clinical Professor of Law at the Benjamin N. Cardozo School of Law.

We hope that this timely information will be helpful to you in your practice as you deal with DNA issues.

Very truly yours,

THE PUBLISHER'S
EDITORIAL STAFF

NEW YORK'S DNA DATA BANK AND COMMISSION ON FORENSIC SCIENCE

by

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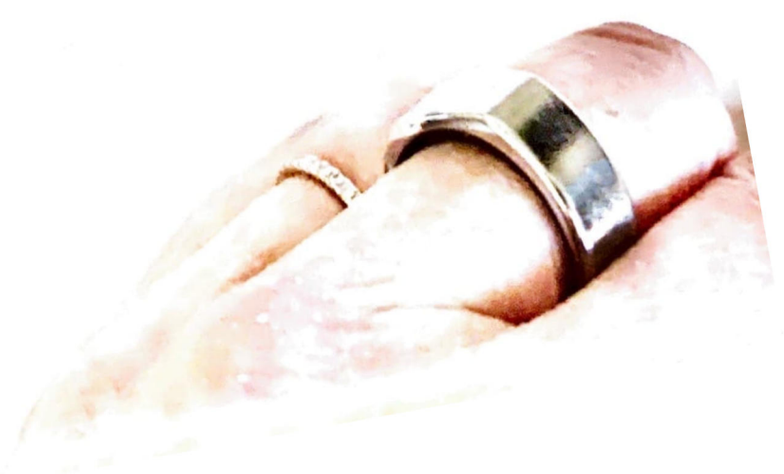

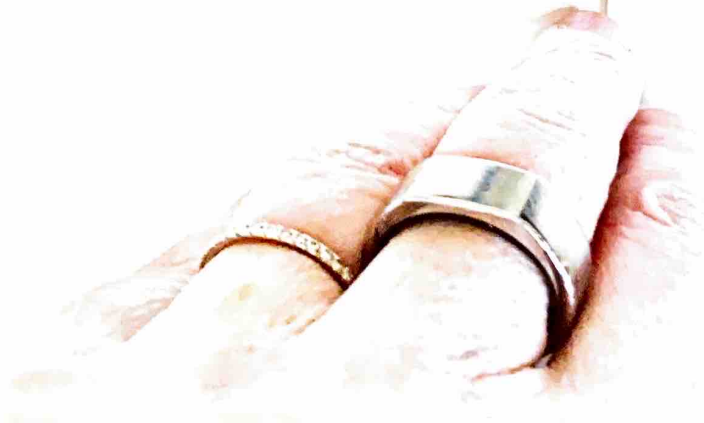

NEW YORK'S DNA DATA BANK AND COMMISSION ON FORENSIC SCIENCE

SYNOPSIS

§ 1 Introduction*

[1] The New Legislation

New York's 1994 DNA legislation[1] amends the Executive Law to add a new Article 49-B, entitled Commission on Forensic Science and Establishment of DNA Identification Index.[2] In addition to providing for the Commission and a computerized DNA identification index of persons convicted of certain designated crimes, the legislation provides that the Commission establish a subcommittee on forensic DNA laboratories and testing.[3] Furthermore, the legislation adds a new provision to C.P.L. § 440.30 dealing with motions requesting the performance of a forensic DNA test, where the defendant was convicted before January 1, 1996.[4]

[2] Prior Regulation of DNA Evidence

[a] New York State

On October 5, 1988, the Senate and Assembly held a joint hearing in New York City on forensic DNA. In addition, Governor Cuomo established a Panel on Genetic Fingerprinting in July 1988, which, in September 1989, issued a report that recommended the establishment of a state accreditation process for public and private DNA forensic laboratories, and the establishment of a DNA data bank for sex offenders. In 1990, the state Division of Criminal Justice Services established the New York State DNA Advisory Committee; the New York State DNA Scientific Review Board was formed in 1991.

[b] FBI's CODIS

In 1990, the FBI began development of a national DNA identification index called "CODIS," from the words, "*CO*mbined *D*NA *I*ndex *S*ystem." According to the FBI:

> The CODIS concept is based on a single central repository of DNA records. These DNA records will be locally generated by subscribing laboratories from around the country. The centralized repository of DNA records will

* Section prepared by George H. Barber, Esq.

1 L. 1994, Ch. 737.

2 L. 1994, Ch. 737, § 1.

3 *Id.*

4 L. 1994, Ch. 737, § 2.

following states have DNA statutes but, as of 1993, the data banks were not operational: Arizona, Colorado, Georgia, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Missouri, Nevada, North Carolina, Ohio, South Dakota, Tennessee, Utah, West Virginia, and Wisconsin. CODIS is not now operational but, because of recent federal crime legislation, probably will be in the near future.[9]

Most state statutes require DNA testing for certain designated convicted persons, such as convicted sex offenders. California also includes DNA testing of evidence at crime scenes. A Virginia statute requires all felons convicted subsequent to July 1, 1990, and certain sex offenders incarcerated as of July 1989, to have blood drawn for DNA testing.

[3] The Need for a New York DNA Statute

In approving Chapter 737, Governor Cuomo stated, "New York joins 26 other states which have enacted DNA Data Bank Statutes." Prior to Chapter 737, there were no New York State laws or regulations that applied to forensic DNA analysis and DNA laboratories or to forensic testing and laboratories. This lack recently became crucial because, in *People v. Wesley,*[10] the Court of Appeals held that forensic DNA evidence was admissible and that courts could take judicial notice of forensic DNA Restriction Fragment Length Polymorphism (RFLP) analysis.[11]

One of the major criticisms of the use of DNA evidence in criminal prosecutions was the lack of minimum standards for laboratories that did DNA testing. Chapter 737 requires public laboratories doing DNA testing and forensic testing in New York State to obtain accreditation, and sets up procedures to obtain accreditation.

[9] The Violent Crime Control and Law Enforcement Act of 1994, P.L. 103-322, 108 Stat. 1796, Sept. 13, 1994, contains in Title XXI, State and Local Law Enforcement, the DNA Identification Act of 1994, Act §§ 210301-210306, 108 Stat. 2065-2071. Section 210304, Index to Facilitate Law Enforcement Exchange of DNA Identification Information, authorizes the establishment of a DNA index for certain purposes. Section 210306 authorizes appropriations to the FBI for the purpose of carrying out the DNA Identification Act.

[10] 83 N.Y.2d 417, 611 N.Y.S.2d 97, 633 N.E.2d 451 (1994), *aff'g* 183 A.D.2d 75, 589 N.Y.S.2d 197 (3d Dept. 1992), *aff'g* 140 Misc. 2d 306, 533 N.Y.S.2d 643 (Albany County Ct. 1988).

[11] For a discussion of the science of DNA profiling, see § 3 *infra.*

...establish ...matches in ...ards have been ...only reliable and com- ...contained in the CODIS files.[5]

...many steps in strong support of a national ...In November 1991, it issued a 70 page pamphlet *Legislative Guidelines For DNA Databases,* to assist ...states in drafting DNA legislation by indicating topics that should be contained in a DNA data base statute. According to the guidelines, "As a matter of policy, the FBI will honor a request from a designated state agency to delete the DNA record from CODIS."[7]

The FBI has also stated the following:

> Presently, the tests are only used to compare known samples from an identified suspect with a questioned biological sample recovered from a crime scene. However, eventually the test will help identify potential suspects through the establishment of data bases which store the genetic profiles of known criminal offenders. The genetic profiles will be stored in computers so that they can be easily compared against crime scene samples recovered anywhere in the United States to help identify potential suspects. The potential of a national or worldwide data base for solving previously unsolvable crimes is immeasurable.[8]

[c] DNA Data Banks in Other States

DNA data bank legislation has been enacted and is operational in the following eight states: California, Florida, Illinois, Kansas, Minnesota, Oregon, Virginia, and Washington. The

[5] *FBI, Standards for CODIS Acceptance of DNA Data 65 (1994).*

[6] *On August 4, 1993, the FBI issued The National DNA Identification Index (CODIS) Program Description and stated: "The CODIS development is proceeding as a pilot program. This pilot development effort includes the participation of thirteen state and local law enforcement DNA laboratories in ten states." In December 1993, the FBI described its progress on its four phase timetable. Phase 1, which established the necessary telecommunications, was complete. Phase 2, which established initial DNA matching capabilities and enhanced DNA image analysis, was complete. Phase 3 will establish the local CODIS indexes and enhance DNA matching. Phase 4 will establish state and national level CODIS indexes.*

[7] *FBI, Legislative Guidelines For DNA Databases 6 (1991).*

[8] *FBI, Legal Aspects of Forensic DNA Evidence (1993).*

§ 2 Overview of the Statute*

[1] Definitions

Executive Law § 995, as created by Chapter 737, provides the definitions of many terms. Some will be described *infra* in relevant discussions. Certain basic definitions, however, are provided here.

A "forensic laboratory" is defined as "any laboratory operated by the state or unit of local government that performs forensic testing on evidence in a criminal investigation or proceeding or for purposes of identification," except fingerprinting.[1] In contrast, a "forensic DNA laboratory" is a forensic laboratory operated by the state or a unit of local government "that performs forensic DNA testing on crime scenes or materials derived from the human body for use as evidence in a criminal proceeding or for purposes of identification."[2] "Forensic DNA testing" is then defined as "any test that employs techniques to examine deoxyribonucleic acid (DNA) derived from the human body . . . to resolve issues of identification," except for DNA testing performed pursuant to Public Health Law, Title 5, Article 5.[3]

[2] Commission on Forensic Science

As used in Executive Law Article 49-B, "Commission" refers to the "Commission on Forensic Science," created in Executive Law § 995-a.[4] The Commission, part of the Executive Department, shall consist of 14 members, with the commissioner of the Division of Criminal Justice Services as the chairperson.[5] The commissioner of the Department of Health or his or her designee shall serve as an ex-officio member.[6] The 12 remaining members are to be appointed by the governor.[7] One of these members shall be the chairperson of the New York State Crime Laboratory Advisory Committee, one the director of a forensic

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* Section prepared by George H. Barber, Esq.

[1] Exec. L. § 995(1). *See also* Exec. L. § 995-e.

[2] Exec. L. § 995(2). *See also* Exec. L. § 995-e.

[3] Exec. L. § 995(2).

[4] Exec. L. § 995(10).

[5] Exec. L. § 995-a(1)(a).

[6] *Id.*

[7] Exec. L. § 995-a(1)(b).

necessary and appropriate, and approval of forensic laboratories for the performance of specific forensic methodologies.[15]

The Commission shall design the minimum standards and program of accreditation to accomplish the following objectives:

(a) increase and maintain the effectiveness, efficiency, reliability, and accuracy of forensic laboratories, including forensic DNA laboratories;

(b) ensure that forensic analyses, including forensic DNA testing, are performed in accordance with the highest scientific standards practicable;

(c) promote increased cooperation and coordination among forensic laboratories and other agencies in the criminal justice system;

(d) ensure compatibility, to the extent consistent with the provisions of this article and any other applicable provision of law pertaining to privacy or restricting disclosure or redisclosure of information, with other state and federal forensic laboratories to the extent necessary to share and exchange information, data and results of forensic analyses and tests; and

(e) set forth minimum requirements for the quality and maintenance of equipment.[16]

The Commission's accreditation program for forensic laboratories must have the following minimum requirements:

(a) inspections of laboratories as necessary to ensure compliance with accreditation requirements;

(b) proficiency testing;

(c) quality control and quality assurance protocols; and

(d) annual certifications to the Commission by the laboratories of compliance with the accreditation requirements; in the case of forensic DNA laboratories, the certifications are forwarded to the DNA subcommittee.[17]

The Commission has the power to revoke or suspend accreditation of a forensic laboratory in the event a laboratory or its

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[15] Exec. L. § 995-b(1).

[16] Exec. L. § 995-b(2).

[17] Exec. L. § 995-b(3)(a)-(d).

The Commission is required to establish a subcommittee on forensic DNA laboratories and forensic DNA testing.[24] The chairperson of the Commission will appoint the chairperson of the DNA subcommittee. The subcommittee chairperson then will appoint six other members of the subcommittee, four of whom will be on the recommendation of the commissioner of the Department of Health. Three of these four must represent the disciplines of molecular biology, population genetics, and laboratory standards and quality assurance regulation, respectively; one must be a forensic scientist.[25] The commissioner of the Division of Criminal Justice Services is authorized to recommend one member who is a representative of the discipline of population genetics and one member who is a representative of the discipline of forensic science.[26]

Accreditation for a DNA laboratory "shall be under the direction of the DNA subcommittee" and such subcommittee "shall have the sole authority to grant, deny, review or modify a DNA forensic laboratory accreditation pursuant to this article, provided that such authority shall be effectuated through binding recommendations made by the DNA subcommittee to the commission." In the event the Commission disagrees with any such recommendations, it may notify the subcommittee and request the subcommittee "to reasonably review such binding recommendations." The DNA subcommittee shall conduct the review and either forward revised binding recommendations to the Commission or indicate, with the reasons therefor, that after review the subcommittee determined that the binding recommendations should not be revised.[27]

Under the statute, the DNA subcommittee is also required to:

> assess and evaluate all DNA methodologies proposed to be used for forensic analysis, and make reports and recommendations to the Commission as it deems necessary. The DNA subcommittee shall make binding recommendations for adoption by the Commission addressing minimum scientific standards to be utilized in conducting forensic DNA analysis including, but not limited to, examination of specimens, population studies and methods employed to determine probabilities and interpret test results. The DNA subcommittee may require a demonstration by an independent laboratory of any proposed forensic DNA testing methodology proposed to be used by a forensic laboratory.[28]

[24] Exec. L. § 995-b(13)(a).

[25] *Id.*

[26] *Id.*

[27] Exec. L. § 995-b(2-a).

The DNA subcommittee must also make binding recommendations to the Commission with regard to an accreditation program for laboratories performing DNA testing, including internal and external proficiency testing with, if possible, a blind external proficiency testing program.[29] In addition, the subcommittee is authorized to advise the Commission on any matters regarding the implementation of scientific controls and quality assurance procedures for DNA testing, and on any other matters referred to it by the Commission.[30]

[5] DNA Identification Index

The Commission, in consultation with the DNA subcommittee, must, after reviewing recommendations from the Division of Criminal Justice Services, promulgate a policy for the establishment and operation of a DNA identification index consistent with the operational requirements and capabilities of the Division of Criminal Justice Services.[31] Under the statute, the policy must address the following issues:

(a) the forensic DNA methodology or methodologies to be utilized in compiling the index; and

(b) procedures for assuring that the state DNA identification index contains the following safeguards:

(i) accurate and complete maintained records;

(ii) effective software and hardware for security to prevent unauthorized access;

[28] Exec. L. § 995-b(13)(b).

[29] Exec. L. § 995-b(13)(c). In Exec. L. § 995(4), "blind external proficiency testing" is defined to mean "a test sample that is presented to a forensic laboratory for forensic DNA testing through a second agency, and which appears to the analysts to involve routine evidence submitted for forensic DNA testing."

[30] Exec. L. § 995-b(13)(d).

[31] Exec. L. § 995-b(9).

(iii) audits "to ensure that no illegal disclosures" have taken place;

(iv) access restricted to authorized personnel only;

(v) operational programs that will prohibit inquiry, record updates, or destruction of records from any source other than an authorized source;

(vi) operational programs to detect unauthorized attempts to penetrate the DNA identification index;

(vii) adequate and timely procedures to ensure that any subject of the state DNA identification has the right of access to and review of records relating to that individual contained in the index for the purpose of ascertaining their accuracy and completeness, including procedures for review of information maintained about such individuals and administrative review (including procedures for administrative appeal) and the necessary documentation to demonstrate that the information is inaccurate or incomplete;

(viii) access to the index granted to an agency authorized by Article 49-B to have access "only pursuant to a written use and dissemination agreement, a copy of which is filed with the commission"; this agreement is required to prohibit redisclosure by the agency of any information obtained;

(ix) mutual exchange, use, and storage of DNA records with the system of DNA identification used by the FBI, provided that the Commission determines such exchange, use, and storage are consistent with Article 49-B and applicable law.[32]

Once the Commission promulgates this policy, the commissioner of the Division of Criminal Justice Services is authorized to make a plan for the establishment of a computerized state DNA identification index within the Division of Criminal Justice Services.[33] Once the Commission and DNA subcommittee review and approve the plan, and file it with the speaker of the Assembly and the temporary president of the Senate, the

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[32] *Id.*

[33] Exec. L. § 995-c(1).

be released to an authorized entity, for purposes of creating or maintaining a population statistics data base or for identification, research, or quality control purposes, after personally identifying information has been removed.[41]

In a criminal action or proceeding, the defense shall have access to information in the DNA identification index "relating to the number of requests previously made for a comparison search and the name and identity of any requesting party."[42]

DNA records in the identification index must be expunged in the event of a criminal reversal or pardon; the Division of Criminal Justice Services must make rules or regulations to deal with other materials and records in the possession of other agencies.[43]

Confidentiality of all "records, findings, reports, and results of DNA testing" is required; disclosure is prohibited absent consent of the subject of the DNA testing.[44] In addition, disclosure may not be made in response "to a subpoena or other compulsory legal process," except a subpoena issued on behalf of the subject of a DNA record or on behalf of a party in a civil proceeding where the subject of the DNA record has put the record in issue.[45] However, records in the DNA identification index may be disclosed in a criminal proceeding.[46]

Any person who intentionally discloses a DNA record, test results, or analysis to an unauthorized individual or agency, or intentionally uses or receives DNA records, test results, or analysis for an unauthorized purpose, is guilty of a class A misdemeanor and subject to a fine of not more than $10,000 and other penalties.[47]

[6] Criminal Procedure Law Section 440.30

In addition to adding Executive Law Article 49-B, Chapter 737 amended C.P.L. § 440.30.[48] Section 440.30 provides for

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41 Exec. L. § 995-c(6)(c).

42 Exec. L. § 995-c(8).

43 Exec. L. § 995-c(9).

44 Exec. L. § 995-d(1).

45 *Id.*

46 Exec. L. § 995-d(2).

47 Exec. L. § 995-f.

48 L. 1994, Ch. 737, § 2.

DNA identification index, is to take effect on January 1, 1996, and applies to designated offenders convicted on or after that date.[51] In addition, the Commission on Forensic Science and the commissioner of the Division of Criminal Justice Services "shall promulgate such rules and regulations as may be necessary to effectuate the purposes of this act" prior to January 1, 1996.[52] Furthermore, "no forensic laboratory shall be required to become fully accredited with respect to the performance of DNA testing pursuant to this act prior to January 1, 1996 and . . . no forensic laboratory shall be required to be fully accredited prior to July 1, 1997."[53]

§ 3 The Science of DNA Profiling*

Although the principles of molecular biology are far too complex for most nonscientists to grasp, the basics of DNA (deoxyribonucleic acid) profiling are straightforward. DNA is a molecule located in the nucleus of a cell. No two individuals (except identical twins) have the same DNA. Each individual's DNA houses a genetic code that transmits information—a veritable operating manual for the human body. Identical code-carrying DNA molecules are present in all cells that have a nucleus, including white blood cells, sperm, epithelial cells surrounding hair roots, and cells in saliva.[1] Variations exist among individuals' DNA structure, but the genetic composition of human beings has more similarities than differences.[2] Almost 97 percent of our DNA is the same; this identity of structure unites us as a single species.

[1] DNA Profiling

Profiling technology is designed to provide information about identity by detecting and revealing the subtle differences in the biochemical structure of a cell through the use of genetic markers. This technology is an outgrowth of conventional

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51 *Id.*

52 *Id.*

53 *Id.*

* Section prepared by Professor Mira Gur-Arie.

1 *See* National Research Council, DNA Technology in Forensic Science 2 (National Academy Press 1992) [hereinafter NRC Report].

2 William C. Thompson & Simon Ford, *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests,* 75 Va. L. Rev. 601, 618 (1989).

biological material from the surface it is on (i.e., using chemicals to remove blood from a piece of clothing) and releasing the DNA from the cells. After the DNA has been extracted and cleaned with organic solutions, it is divided into fragments by restriction enzymes, biological scissors that cut the DNA chains at specific sites. This process is referred to as "restriction digestion." The fragments are then arranged according to size through a procedure called "agarose gel electrophoresis." The DNA is injected into wells within an agarose gel slab and electrical current is applied, causing fragments of DNA to migrate toward the positive electrode at different rates of speed, depending on their length.

After electrophoresis is complete, the DNA fragments are situated in positions corresponding to their lengths. The fragments are then transferred from the agarose gel to a nylon membrane and the DNA is cross-linked or "fixed" onto the nylon membrane, resulting in what is known as a "Southern Blot." The next phase of the RFLP process is "hybridization." The Southern Blot is exposed to genetic probes with known DNA sequences. The probes are tagged with radioactive markers that lock onto DNA segments complementing the probes' sequence. The probes are designed to be attracted only to polymorphic DNA segments, those that vary somewhat among individuals. An x-ray photographic process enables visualization of the positions of the polymorphic DNA segments by creating a pattern of bands called an "autorad." An autorad is an actual print of the DNA band patterns. The autorads of the two samples are then compared, either visually or by a machine that converts the print patterns into a numerical code. Through this process a match can be declared.

Although each individual has a unique genetic code, RFLP analysis does not compare the particular genetic codes of two individuals. The RFLP procedure actually measures the length of a limited number of DNA fragments at a particular site on the DNA chain. These fragments tend to vary in length among individuals. No single fragment is unique, but an identical combination of fragment lengths is more rare. This combination of fragment lengths constitutes a pattern that is referred to as a DNA profile. A DNA profile comparison simply contrasts two sets of fragment length patterns. When two profiles are compared and a match is made, statistics from population genetics must be consulted to estimate the frequency with

(Matthew Bender & Co., Inc.)

is still evolving. RFLP remains very expensive to use as well as vulnerable to error.[11] Much has been written about the vagaries of the sample collection and testing processes.[12] False matches may occur as a result of sample contamination, mix-ups during the transfer of samples, errors in the performance of the testing itself, and inaccurate readings during the comparison of autorads. Thus, not only is the significance of RFLP analysis commonly mischaracterized, but the procedure itself is often erroneously described as foolproof or 100 percent accurate.[13]

At each step of the criminal investigation and subsequent forensic analysis lurk opportunities for serious errors that can undermine the reliability of the profiling results. When a DNA test is performed in a laboratory for purely research purposes, the technician has access to clean tissue samples, specimens from known sources, samples of sufficient size that enable the repetition of any inconclusive or compromised test, and a controlled environment with no exposure to outside information that may influence the technician. Most importantly, in a diagnostic setting, the results of the forensic tests can be validated by testing for laboratory error rates: the same experiment can be repeated, confirming its accuracy.

In the forensic arena, by contrast, the conditions are far from ideal. The samples tested have been collected from a crime scene, rendering them vulnerable to the effects of weather and contaminants and to the possibility of tampering. Similarly, these samples often derive from multiple unknown sources, requiring a more exacting testing process, and are frequently of limited size, precluding the possibility of subsequent testing. The accuracy of the forensic procedures cannot be validated, making the testing process vulnerable to unknown error rates.[14]

in conjunction with the HLA (Human Leukocyte Antigen) DQ-alpha reverse dot blot probe system and "polymarker" VNTR's (the DiS80 system), Mitochondrial DNA (Mt DNA), and DNA Sequencing. See the Appendix for an illustration of PCR.

[11] *See* Thompson & Ford, *supra* note 2, at 620-32.

[12] *See* Janet Hoeffel, *The Dark Side of DNA Profiling: Unreliable Scientific Evidence Meets the Criminal Defendant*, 42 Stanford L. Rev. 465, 477-94 (1990); Thompson & Ford, *supra* note 2, at 621-22; Dan L. Burk, *DNA Fingerprinting: Possibilities and Pitfalls of A New Technique*, 28 Jurimetrics 455, 464 (Spring 1988).

[13] Hoeffel, *supra* note 12, at 466.

[14] This distinction is especially significant. Forensic tests are less amenable to validation than technological applications "where 'erroneous principles

Also often overlooked is the possibility that exposure to law enforcement officials and the facts surrounding a particularly heinous crime may subtly prejudice the laboratory technician's work and subsequent analysis of test results. For example, a near match of very similar bands may be construed as a match when a technician is aware that the crime suspect and source of the known sample is believed to be responsible for a number of gruesome murders.

Finally, the application of population genetics to DNA markers, perhaps the most critical step for understanding the significance of a profile match, is far from universally accepted. Some courts have concluded that the statistical significance of a match is so controversial that all DNA evidence must be excluded.[15] This debate focuses on the adequacy of the population data on which frequency estimates are based and the role of racial and ethnic origin in frequency estimates.[16] Variations in the statistical calculation method employed can yield disturbingly disparate numerical probabilities,[17] and hence can have

will be found out because patients will not get well, planes will not fly, or chemicals will not be synthesized.' " Barry C. Scheck, *DNA and Daubert*, 15 Cardozo L. Rev. 1959, 1969 (1994) (quoting Michael J. Saks & Richard Van Duizend, The Use of Scientific Evidence in Litigation 74 (1983)). One suggested solution to this problem is sample splitting: division of the DNA sample for examination by one or more different laboratories. If the laboratories get the same results, an independent check on accuracy is achieved. *Id.* The ability to do this, however, is limited by the quantity of sample available.

[15] *See* People v. Wesley, 83 N.Y.2d 417, 444 n.9, 611 N.Y.S.2d 97, 113 n.9, 633 N.E.2d 451, 467 n.9 (1994) (Kaye, J. concurring) (citing Commonwealth v. Curnin, 409 Mass. 218, 565 N.E.2d 440 (1991); *Ex parte* Perry, 586 So. 2d 242 (Ala. 1991); People v. Barney, 8 Cal. App. 4th 798, 10 Cal. Rptr. 2d 731 (1992). According to Judge Kaye, other courts have admitted testimony to the extent of confirming that the DNA test did not exclude the defendant but precluded testimony concerning the statistical significance of a match. *See* Prater v. State, 307 Ark. 180, 820 S.W.2d 429 (1991); State v. Bible, 175 Ariz. 549, 858 P.2d 1152 (1993); State v. Pennell, 584 A.2d 513 (Del. 1989); State v. Schwartz, 447 N.W.2d 422 (Minn. 1989); State v. Houser, 241 Neb. 525, 490 N.W.2d 168 (1992); State v. Vandebogart, 136 N.H. 365, 616 A.2d 483 (1992); State v. Anderson, 115 N.M. 433, 853 P.2d 135 (1993); Rivera v. State, 840 P.2d 933 (Wyo. 1992); United States v. Porter, 618 A.2d 629 (D.C. Ct. App. 1992).

[16] NRC Report, *supra* note 1, at 74-75. If the crime suspect is believed to come from an isolated or endogamous subgroup and there has been no direct sampling of this subgroup, there is a danger of "making an 'untestable' statistical estimate that could unfairly prejudice a defendant." Scheck, *DNA & Daubert*, *supra* note 14, at 1973; *see also* Richard Lempert, *The Suspect Population and DNA Identification*, 34 Jurimetrics J. 1, 5 (1993).

[17] NRC Report, *supra* note 1, at 75.

a considerable impact on a jury's consideration of DNA evidence.

In contrast to the controversy surrounding the reliability of declaring a match to prove that someone was the source of DNA trace evidence,[18] excluding someone as a source requires a less complex set of procedures and hence is seldom disputed.[19] Forensic exclusions do not require consideration of population genetics. Nor do they demand precise quantitative measurement of DNA bands, therefore posing fewer problems of interpretation.[20] For this reason, DNA evidence may be a powerful tool for the defense.

[5] The Future of DNA Forensics

The state of DNA science is still in flux. RFLP, though now accepted by many courts, is less reliable than newer technologies being developed and soon may become obsolete.[21] Careful scrutiny of this and other techniques remains critical. The National Research Council of the National Academy of Sciences conducted a rigorous and in-depth evaluation of the various controversial aspects of DNA typing technology and its use in the field of forensics. The NRC released a report in 1992, DNA Technology in Forensic Science,[22] that addressed the limitations of DNA profiling and stressed the importance of strict quality assurance standards, regular proficiency testing, close regulation of forensic laboratories, and conservative statistical interpretations of genetic population frequencies.[23]

With its promise of assisting in the war on crime, and in spite of the many concerns about its reliability and interpretation,

[18] *See* Jonathan Koehler, *Error and Exaggeration in the Presentation of DNA Evidence at Trial,* 34 Jurimetrics J. 21, 22-27 (1993).

[19] Scheck, *DNA & Daubert, supra* note 14, at 1966.

[20] *Id.* at 1967; *see also* Richard Lempert, *Some Caveats Concerning DNA as Criminal Identification Evidence: With Thanks to the Reverend Bayes,* 13 Cardozo L. Rev. 303, 316 (1991).

[21] In a few years Mitochondrial DNA Sequencing will be on the cutting edge of DNA technology. This technique has been said to be far more accurate and reliable than RFLP and potentially less expensive to utilize. *See* testimony of Kary Mullis in People v. McIntosh & Schlaepfer (August 23, 1994).

[22] NRC Report, *supra* note 1.

[23] The NRC has recently formed a new committee to further study the reliability of DNA forensics, focusing on laboratory error rates and the reliability of population statistics calculations. *See ScienceScope,* Science, Aug. 26, 1994, at 1163.

DNA profiling is the wave of the present in criminal proceedings. RFLP and a number of other profiling methods will be used with increasing frequency in criminal investigations. Courts around the country have been confronting the reliability of the science and accompanying statistical estimates with varying degrees of acceptance and skepticism. In New York, the verdict is in: RFLP is admissible and the public has demanded access to the DNA profiles of convicted felons.

§ 4 DNA Evidentiary Issues*

[1] Admissibility of DNA Evidence in New York

In March 1994, the Court of Appeals, in *People v. Wesley,*[1] ruled that DNA profiling evidence is admissible in New York State. *Wesley* involved the murder and rape of an elderly client of a hostel for the developmentally disabled. The defendant, also a client of the hostel, was linked to the crime by overwhelming evidence: a number of incriminating statements, nylon from the defendant's carpet found on the decedent's dress and on the defendant's T-shirt, underpants, and sweatpants, hairs recovered from his apartment, and bloodstains on his clothing. DNA comparisons of the bloodstains, hair follicles taken from the deceased, and blood drawn from the defendant provided additional inculpatory evidence. *Wesley* was one of the first cases in the country to consider the admissibility of DNA typing; from the defense perspective, it was certainly not an ideal case in which to embark on this complex and controversial mission.

Applying the test for admissibility of novel scientific evidence articulated in *Frye v. United States,*[2] the Court ruled that DNA profiling evidence is generally accepted as reliable in the scientific community. The *Frye* hearing in *Wesley* assumed an unusual procedural posture: it was held before any DNA testing had been done or autorads examined. When reviewing the trial court's *Frye* ruling, the Court of Appeals was compelled to consider the reliability of RFLP in the abstract. After concluding that this methodology was accepted in the scientific community, the Court accepted without critical scrutiny the finding that Lifecodes Corporation, the forensic laboratory responsible

* Section prepared by Professor Mira Gur-Arie.

[1] 83 N.Y.2d 417, 611 N.Y.S.2d 97, 633 N.E.2d 451 (1994).

[2] 293 F. 1013 (D.C. Cir. 1923).

for the DNA analysis in *Wesley*, utilized adequate quality control standards, submitted to peer review, and employed proper procedures.[3]

Chief Judge Kaye wrote a separate concurrence, noting a number of infirmities in the majority's analysis. She disputed the finding that RFLP was accepted as reliable in 1988, the time of the *Frye* hearing in *Wesley*. Any apparent absence of controversy surrounding RFLP in 1988, she wrote, was a function not of consensus within the scientific community but of the novelty of this technology. "Insufficient time had passed for competing points of view to emerge."[4]

Judge Kaye pointed out that significant disputes still raged within the scientific academy concerning the reliability of the visual matching techniques employed in *Wesley*[5] and the use of population statistics to interpret matches.[6] She also discussed the lack of agreed-upon standards and laboratory protocol for DNA profiling techniques and the nonexistence of true peer review, commenting on the inherent unreliability of self-validation studies.[7] The prosecution in *Wesley* presented the opinions of two scientists with commercial interests in the validation of RFLP. Indeed, during the *Frye* hearing, the trial court relied in large part on the expert testimony of Dr. Michael Baird, Director of Forensics at Lifecodes. No impartial forensic scientist with expertise in this area testified.

In an effort to counter Judge Kaye's concerns, the majority decision repeatedly distinguished questions of admissibility from those of weight. Any infirmities in the collection or analysis of DNA evidence "not affecting its trustworthiness" were found to be irrelevant to the issue of admissibility; they were deemed matters of weight for the jury to consider.[8] Similarly, the reliability of specific methodology and procedure

[3] 83 N.Y.2d at 425, 611 N.Y.S.2d at 101-02, 633 N.E.2d at 455-56.

[4] *Id.* at 439, 611 N.Y.S.2d at 110, 633 N.E.2d at 464.

[5] Lifecodes abandoned this technique in 1989.

[6] The admissibility of the use of population statistics in this context has been challenged in a number of jurisdictions since 1989 and has been criticized within the scientific community by leading population geneticists. 83 N.Y.2d at 444 n.9, 611 N.Y.S.2d at 113 n.9, 633 N.E.2d at 467 n.9.

[7] *Id.* at 439, 611 N.Y.S.2d at 109-110, 633 N.E.2d at 463-649.

[8] *Id.* at 427, 429, 611 N.Y.S.2d at 103, 104, 633 N.E.2d at 457, 458.

were held to be relevant to establishing foundation, not barriers to admissibility.[9]

The analysis in *Wesley* presents a great dilemma for criminal defendants. If all controversies about the manner in which a sample is tested are articulated as questions of weight and not admissibility, courts run the very serious risk of perpetuating bad science in the name of deference to jury autonomy. Problems during sample collection and match interpretation can have critical ramifications for the reliability of DNA evidence and may be extremely prejudicial for the defense. Certainly if a particular scientific protocol based on a more general procedure is shown to be unreliable, data procured pursuant to this protocol should not be admitted into evidence.[10] Such untrustworthy evidence would not only be prejudicial but also, arguably, irrelevant. The *Wesley* majority also relegated questions regarding the adequacy of statistical population studies to the netherworld of jury consideration. These population studies are a critical component of the DNA analysis; without probability estimates of the likelihood of a coincidental match, the declaration of a match is absolutely meaningless.[11]

[9] As a practical matter, then, the proponent of the DNA evidence has the burden of proving that the laboratory actually employed the accepted scientific techniques; the opponent must then demonstrate a deviation from these accepted procedures. Edward J. Imwinkelried, *The Debate in the DNA Cases Over the Foundation for the Admission of Scientific Evidence: The Importance of Human Error as a Cause of Forensic Misanalysis*, 69 Wash. U. L.Q. 19 (1991); *see also* People v. Keene, 156 Misc. 2d 108, 591 N.Y.S.2d 733 (Sup. Ct. Queens County 1992).

[10] An analytical or technical error with potential for skewing a test result (or its subsequent interpretation) will inevitably impact on the trustworthiness of the underlying scientific evidence. This possibility must be considered as a factor bearing on admissibility.

[11] Under Daubert v. Merrell Dow Pharmaceuticals, Inc., — U.S. —, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993), the test for admissibility of scientific evidence demands a more thoughtful consideration of the complex issues of scientific validity. *Daubert* explicitly directs judges to assess the "scientific validity" of the proposed scientific evidence. In his majority decision, Justice Blackmun posed such questions as: is the hypothesis upon which the scientific methodology is based testable; has it been tested; is there a known error rate; has the process been subjected to peer review and proficiency testing to ensure its reliability. This inquiry moves away from accepting a technique in the abstract and focuses on the key issue for admissibility: is the method reliable In attempting to confront this inquiry, courts will be forced to " 'come t grips with science.' " Barry C. Scheck, *DNA and Daubert*, 15 Cardozo L. Re 1959, 1961 (1994) (quoting Bert Black & John A. Singer, *From Frye Daubert: A New Test for Scientific Evidence*, 1 Shepard's Expert & S Evidence Q. 19, 40-41 (1993)).

Mindful of the overwhelming impact DNA analysis can have on a jury, Judge Kaye emphasized the importance of carefully scrutinizing such scientific evidence. She quoted from the NRC Report:

> Forensic DNA analysis should be governed by the highest standards of scientific rigor in analysis and interpretation. Such high standards are appropriate for two reasons: the probative power of DNA typing can be so great that it can outweigh all other evidence in a trial; and the procedures for DNA typing are complex, and judges and juries cannot properly weigh and evaluate conclusions based on differing standards of rigor.[12]

This quote underscores the dangers of the legal community embracing advances in forensic science before the reliability of the technology has been proven. Although DNA testing is an attractive new tool for fighting crime, the courts must look carefully before getting on the DNA bandwagon.

[2] Other Evidentiary Issues

Despite *Wesley*'s broad embrace of DNA evidence, there remain areas to be contested. *Wesley* only resolved the admissibility of RFLP testing, and its holding can be limited in large part to the facts of the case. *Wesley* did not suggest that the scientific methods used in 1988 would be acceptable in 1994; nor did the plurality decide what protocol would have to be met for RFLP to be admissible by current scientific standards. The visual matching technique employed by Lifecodes in the *Wesley* case (and criticized by the concurrence) has been criticized by a number of forensic scientists and was in fact abandoned by Lifecodes in 1989.

New forensic procedures will require new *Frye* hearings. Similarly the introduction of novel methods used to acquire and analyze samples must be resolved on a case by case basis. Counsel for defendants should be prepared to vigorously litigate the question of whether the laboratory used by the prosecution actually employed accepted scientific protocol and to argue that any infirmities must bear on the admissibility of the evidence.

[12] 83 N.Y.2d at 446, 611 N.Y.S.2d at 114, 633 N.E.2d at 468 (quoting National Research Council, DNA Technology in Forensic Science 52 (National Academy Press 1992) [hereinafter NRC Report]).

Defense attorneys attacking DNA evidence should include in their demands for discovery requests for autorads, PCR dot blot strips, yield gels, slot blots, all laboratory notes and reports relating to the DNA testing process, laboratory protocols, quality control and assurance records for the laboratory performing the test (including open, blind, internal and external proficiency test data), genotype tables for the laboratory's data bases relied on for statistical estimates, population frequency calculations used, and records concerning the source of contributors to the statistical data base.[13] Especially critical to the challenge of DNA evidence is a reliable estimate of the laboratory's error rate as determined by external blind proficiency tests.[14] The importance of this error rate to a justified determination of reliability must be underscored.[15] Possibly worth pursuing, depending, of course, on defense strategy, is access to the samples tested by the prosecution to arrange for independent testing by the defense.

DNA evidence also may be used offensively in New York courts to exonerate an accused or overturn a wrongful conviction. The new C.P.L. § 440.30(1-a) authorizes courts to order forensic DNA testing, post-conviction, on a showing that "if the results had been admitted in the trial . . . there exists a reasonable probability that the verdict would have been more favorable to the defendant." Post-trial discovery demands should include a request for access to samples for post-conviction DNA testing to prove innocence.[16]

[13] *See* comments of Barry C. Scheck at New York State Judicial Conference, Long Island, July 18, 1994.

[14] *See* Jonathan Koehler, *DNA Matches and Statistics: Important Questions, Surprising Answers,* 76 Judicature 222, 228 (1993); Jonathan Koehler, *Error and Exaggeration in the Presentation of DNA Evidence at Trial,* 34 Jurimetrics J. 21, 24 (1993).

[15] As the NRC Report explains:

> Especially for a technology with high discriminatory power, such as DNA typing, laboratory error rates must be continually estimated in blind proficiency testing and must be disclosed to juries. For example, suppose the chance of a match due to two persons having the same pattern were 1 in 1,000,000, but the laboratory had made one error in 500 tests. The jury should be told both results; both facts are relevant to a jury's determination.

NRC Report, *supra* note 12, at 89.

[16] *See* People v. Chalmers, Ind. No. 86-01094, slip op. entered 5/4/94 (Sup. Ct. Westchester Co., West, J.); People v. Callace, 151 Misc. 2d 464, 573 N.Y.S.2d 137 (Suffolk County Ct. 1991).

Finally, *Wesley* did not address the most recent dilemma in the interplay of DNA profiling and the legal system: the admissibility of incriminating evidence collected as a result of a match with a DNA data base index. As the discussion *infra* of the recently codified New York State statute reveals, this area poses a new set of difficult questions.

§ 5 Commentary on the DNA Statute: A Prosecution Perspective*

[1] The Statute Seems to Ensure that Public Laboratories Will Produce High Quality DNA Test Results

In *Wesley,* Chief Judge Judith Kaye wrote a concurring opinion, joined by Judge Ciparick, stating that "the erroneous admission of the DNA evidence was harmless beyond a reasonable doubt."[1] At the time of the DNA testing in *Wesley,* the only DNA practitioners were the commercial laboratories Cellmark, Cetus, and Lifecodes. Judge Kaye commented that "no laboratory conducting DNA analysis had been accredited for that purpose."[2] Judge Kaye stated with reference to an NRC Report that the "panel called for formal quality-control programs in all laboratories" and quoted the NRC Report's language in reference to the value of high standards of scientific rigor in analysis and interpretation of forensic DNA evidence.[3]

Prior to *Wesley,* many legal writers had voiced similar constructive criticisms. For example, Professor Barry C. Scheck of the Cardozo School of Law in New York City stated:

> The scientific community has consistently called for meaningful quality assurance in forensic DNA laboratories, certification of personnel, and regular proficiency testing by an independent group of scientists. (Ad Hoc Committee on Individual Identification by DNA Analysis; The American Society of Human Genetics 1990; National Academy of Sciences 1992).[4]

Professor Scheck also stated:

* Section prepared by George H. Barber, Esq.

[1] 83 N.Y.2d 417, 446, 611 N.Y.S.2d 97, 114, 633 N.E.2d 451, 468 (1994).

[2] *Id.* at 440, 611 N.Y.S.2d at 110, 633 N.E.2d at 464.

[3] *See* text accompanying note 12 in § 4[1] *supra.*

[4] Barry Scheck, *DNA Data Banking: A Cautionary Tale,* 54 Am. J. Hum. Genetics 931-33 (1994).

> A strong quality-assurance program is also indispensable to the reliable construction and operation of the forensic data banks . . . . Without an independent group of scientists and forensic scientists setting quality-assurance standards, as recommended by the NRC, it is simply unrealistic to expect that the FBI will impose rigorous quality-assurance standards on itself and state laboratories . . . ."[5]

The 1994 DNA legislation completely satisfies, for public laboratories, all of the above concerns. Under Executive Law § 995-b(13)(a), the members of the subcommittee on forensic DNA laboratories and forensic DNA testing must represent a broad spectrum of scientists in fields relevant to DNA testing. This highly qualified subcommittee is empowered, under Executive Law § 995-b(13)(b)-(d), to make binding recommendations to the Commission on Forensic Science relating to minimum scientific standards to be used in forensic DNA analysis and accreditation for laboratories performing forensic DNA testing; in addition, it may advise the Commission on other relevant issues. Furthermore, the legislation provides, in Executive Law § 995-b(3), for minimum standards for forensic laboratory accreditation, including proficiency testing of laboratory personnel, quality control and quality assurance protocols, annual certification, and a method to review the accreditation of a forensic laboratory.

This legislation contains a program of accreditation that should provide quality assurance for public forensic laboratories and forensic DNA laboratories in New York State.

Peter D. Coddington, Chairperson of the DNA Subcommittee of the New York State District Attorneys' Association, in a letter of June 5, 1992 to Commissioner Girgenti, Division of Criminal Justice Services, commented on the NRC Report's

[5] *Id. See* Janet Hoeffel, *The Dark Side of DNA Profiling: Unreliable Scientific Evidence Meets the Criminal Defendant,* 42 Stanford L. Rev. 465 (1990). This article maintains that in DNA profiling evidence "the courtroom is an improper forum for deciding the technique's reliability," an issue that should be returned "to the relevant scientific community." *Id.* at 467. It is maintained that the "lack of uniform standards and quality controls allows the ambiguities and problems in the technique to go unnoticed, thus resulting in the scientifically unreliable declaration of a match." *Id.* at 479. The article concludes: "There is an urgent need for the scientific community to review the DNA profiling technique and designate uniform controls and standards to insure accuracy in the declarations of matches." *Id.* at 538.

recommendation that the use of DNA technology should be promulgated by scientists:[6]

> We agree with this approach. The scientific regulations designed to achieve accurate results should be rigorous and impartial. Good science will produce good evidence, and we prosecutors want our evidence to be as good and as impartially fair as good science can make it.

[2] The Value of a DNA Data Base

In two separate Minnesota cases, the records of DNA convicted offenders were searched and in both cases there was a match and identification of a suspect. Using convicted offender DNA records, the State of Illinois in 1993 discovered a DNA match with DNA evidence left at a crime scene. Similar results have occurred in Virginia, Florida and Nevada.

In September 1994, a defendant was convicted of raping five victims. The defendant had previously been arrested for attempted rape; his DNA test result matched the DNA evidence found at the rape scenes.[7]

DNA has also excluded suspects. In tests performed by the FBI DNA laboratory, 36 percent of rape case tests excluded the primary suspect as to the source of semen.

The 1994 DNA legislation requires that, after conviction, defendants be typed for DNA. A proposal that a DNA data bank be developed from crime scene evidence, including samples from victims and offenders, was not enacted. The FBI index, CODIS, will contain crime scene samples. CODIS will contain a missing person index, a convicted offender index, and a forensic index. The forensic index will contain crime scene DNA profiles of unidentified suspects that will be searched against the convicted offender index.

The current law should be amended to provide for a New York State index of DNA records obtained from samples at crime scenes, even if the criminal is not arrested or identified.

[6] National Research Council, DNA Technology in Forensic Science 105-06 (National Academy Press 1992).

[7] People v. Hamilton, Sept. 23, 1994 (Albany County Ct.).

[3] Future Steps to Implement a DNA Index

It has not yet been determined whether blood drawn from a designated offender will be used. Currently, statewide, only the state police laboratory is doing DNA testing. DNA casework is also being done by the Nassau County Police Department, Nassau County Medical Examiner's Office, New York City Medical Examiner's Office, Suffolk County Medical Examiner's Office, the Westchester County Department of Laboratories and Research, and the Erie County Central Police Services Laboratory. There is no question that funds must be appropriated to perform DNA testing on designated offenders; in addition, a site to store the index data must be chosen.

Many parts of New York State do not have facilities to properly store DNA evidence. "Unlike fingerprint evidence and other physical evidence, DNA samples are extremely sensitive to changes in temperature, humidity, and light."[8] A program should be developed to provide for the proper collection and storage of DNA evidence throughout New York State.

[4] Accreditation of Non-DNA Forensic Laboratories

Executive Law § 995-b(1) requires the Commission to "develop minimum standards and a program of accreditation for all forensic laboratories in New York state"; section 995(1) defines a forensic laboratory as "any laboratory operated by the state or unit of local government that performs forensic testing on evidence in a criminal investigation or proceeding or for purposes of identification" excepts fingerprints.

In *Wesley,* a microscopist from the state police laboratory testified that nylon from the carpet in decedent's apartment was on defendant's T-shirt, underpants, and sweatpants. Fibers from a blanket in defendant's bedroom were located on the decedent's dress and underpants.[9] The microscopist also testified that the decedent's white hairs were on defendant's underpants, T-shirt and sweatpants.

To the extent that *Wesley* is a typical case involving forensic evidence, it would appear that the Commission on Forensic Science will have an enormous task in writing rules and regulations regarding public laboratories using microscopy for

[8] Morehead, *Defense Strategy in DNA Identification Cases,* in 4 Criminal Defense Techniques § 87.02[2].

[9] 83 N.Y.2d 417, 421, 611 N.Y.S.2d 97, 99, 633 N.E.2d 451, 453 (1994).

purposes of forensic identification. Many fields of forensic science are involved, including ballistics, handwriting analysis, metallurgy in the identification of hit and run vehicles, serology for blood identification.

[5] Private Laboratories

The 1994 DNA legislation does not apply to private laboratories doing DNA testing. Prosecutors have been compelled to use private laboratories because of the delay involved in FBI testing and the selective process that must be used by the state police laboratory, which does not have the resources to handle all requests for DNA testing.

The Panel on Genetic Fingerprinting established by Governor Cuomo in 1988 recommended the creation of an accreditation process to monitor public and private laboratories performing forensic DNA analysis services in New York State.[10] The panel's recommendation for a process to accredit private laboratories was rejected in this 1994 DNA legislation.

The New York State police laboratory is the only public laboratory available to most of upstate New York. This laboratory does not currently do PCR testing; it uses out-of-state private laboratories to do PCR testing. Some prosecutors are using out-of-state laboratories for PCR and RFLP tests. There should be a statutory procedure for accreditation or at least quality monitoring of out-of-state private laboratories that perform DNA testing to be used in New York courts. In addition, there should be a statutory program for testing and accreditation of private laboratories doing forensic DNA testing in New York State.

§ 6 Commentary on the DNA Identification Index: A Defense Perspective*

DNA profiling has been heralded as the new frontier in fighting crime. When blood, semen, hair, or other bodily fluids are left by an assailant at the scene of a crime, information about the perpetrator can be gleaned by submitting these samples for DNA analysis. The defense bar has also begun to

[10] John J. Poklemba, DNA Report of the New York State Forensic DNA Analysis Panel, at iii-iv (Sept. 6, 1989).

* Section prepared by Professor Mira Gur-Arie.

exploit the possibilities of this technology, challenging convictions on the basis of newly discovered evidence: DNA testing on biological samples previously untested or subjected only to equivocal conventional serology. Such newly discovered DNA evidence can, to borrow the language recently used by the United States Supreme Court,[1] establish the "actual innocence" of the wrongfully convicted.[2]

In keeping with this trend in litigation, the Court of Appeals, in *Wesley,* held that DNA evidence is admissible in New York State. Sharing the criminal justice system's exuberance with the seemingly vast potential of DNA evidence, the New York State Legislature has commissioned the establishment of a state DNA Identification Index, which requires certain convicted felons to submit blood samples for DNA profiling. Chapter 737 authorizes the Commission on Forensic Science, a group of scientists, attorneys, and others with relevant expertise to oversee the creation and administration of this Index. The scale of necessary research and preparation contemplated by the statute is immense.

The Index is envisioned as a powerful investigative tool, enabling law enforcement agencies to compare the DNA profiles of biological specimens left at crime scenes with an existing data base of convicted felons. Though such use of sophisticated forensics is compelling in theory, a realistic assessment of this legislation reveals a statutory scheme unlikely to meet the expectations of its proponents. The Index is neither cost-effective nor realistically tailored to meet its intended goals, and has dangerous implications for the civil liberties of those subject to testing.

[1] How Useful Is a DNA Identification Index?

The practical utility of a DNA Identification Index is dependent on a number of conditions. In the first instance, a DNA

[1] Herrera v. Collins, — U.S. —, 113 S. Ct. 853, 122 L. Ed. 2d 203 (1993).

[2] The Innocence Project at the Cardozo School of Law Criminal Law Clinic represents convicted inmates who claim that DNA testing will exonerate them. The Project has assisted defendants in gaining access to biological specimens collected during the original investigation of their cases, secured testing of this evidence, and petitioned the courts for post-conviction relief or governors for clemency on the basis of newly discovered evidence. Over the past four years, the Project has assisted a number of individuals who have had their convictions vacated. *See DNA Tests Are Unlocking Prison Cell Doors,* N.Y. Times, Aug. 5, 1994, at A20.

profile is relevant only when the identification of the perpetrator is in issue. When the suspected assailant does not deny his presence at the crime scene—a consent defense to a rape allegation, a justification defense to murder or assault charges—a comparison of profiles is irrelevant.

Similarly, the need to compare DNA profiles arises only when a biological specimen (blood, semen, saliva, hair follicles, etc.) of a quantity sufficient to be tested has been left at a crime scene. Although this is most often the case after a rape has been committed, it is not necessarily true after an assault or homicide. A perpetrator of a violent crime is likely to deposit a testable specimen at a crime scene only when there has been a struggle that results in loss of blood, saliva, hair, or skin. Given the high incidence of homicides and assaults by handgun, this form of hand-to-hand confrontation is statistically far less significant. Even more infrequent are those instances where a nonviolent perpetrator leaves behind a loose hair in a hat, an envelope that has been moistened with saliva, or a random bloody calling card that could provide clues to his or her identity.

[2] Who Should Be Included in the Index?

Another essential premise for the usefulness of this Index (and justification for its scope) is the likelihood of recidivism. The data bank envisioned by Chapter 737 is stocked only with the profiles of convicted felons. Their blood is to be extracted in anticipation that they will strike again. Certainly the disturbing recidivism rate for sex offenders counsels that the presumption of a repeat offense is well-founded.[3] However, the predictive reliability of recidivism rates for other felons is less clear. Under Executive Law § 995(7), the new legislation applies to felons convicted of and sentenced for assault, manslaughter, murder, rape, sodomy, and sexual abuse, as well as persons convicted within the previous five years of one of these felonies who are subsequently convicted of escape in the first and

[3] In a study commissioned by the United States Department of Justice, Bureau of Justice Statistics, in 1989, it was found that repeat rapists were 10.5 times more likely than other felons to have a subsequent arrest for rape, and inmates serving time for other sexual assaults were 7.5 times more likely to be arrested for a sexual assault than other prisoners. Jean E. McEwen & Philip R. Reilly, *A Review of State Legislation on DNA Forensic Data Banking*, 54 Am. J. Hum. Genetics 941, 953 (1994).

(Matthew Bender & Co., Inc.)

possibility of expanding the reach of the data bank beyond convicted felons becomes conceivable.

Also at stake in the proliferation of DNA profiling are the privacy interests of those subjected to mandatory testing. By providing access to the genetic composition of an individual, DNA analysis can reveal a wealth of information. The New York statute mandates the DNA testing of designated offenders "to determine identification characteristics specific to such person[s]."[5] It defines "forensic DNA testing" as any test employing techniques to examine DNA "for the purpose of providing information to resolve issues of identification."[6] Authorized laboratories are permitted to perform DNA analysis "only for those markers having value for law enforcement identification purposes."[7]

The language defining the statute's permissible scope is vague. No explanation of "law enforcement identification purposes" or "criminal proceeding" is given. Advocates for a broad reading of the statute may contend that "law enforcement purposes" includes issues relating to immigration, welfare, child support enforcement, the military, or other government agencies.[8] Relevant "evidence in a criminal proceeding" may be construed as a basis to admit testimony of a behavioral geneticist in support of arguments regarding genetic traits and criminal propensity. Similarly, the terms "identification characteristics" and "issues of identification" are not defined with any particularity. Although testing for genetic diseases or medical conditions is expressly prohibited by Exec. L. § 995(2), these terms could be construed to authorize studies on the genetic disposition of violent felons, sex offenders, and even drug addicts.[9]

The timing of sample collection is also an important feature of the data bank program. Some state data bank statutes provide for the collection of samples before final discharge or parole from prison; others are less specific and simply require collection during incarceration.[10] Under Exec. L. § 995-c(3),

[5] Exec. L. § 995-c(3).

[6] Exec. L. § 995(2).

[7] Exec. L. § 995-c(5).

[8] Barry Scheck, *DNA Data Banking: A Cautionary Tale*, 54 Am. J. Hum. [illegible] 931-933 (1994).

collection of a blood sample occurs after conviction and sentence. If the defendant has his conviction reversed or is pardoned, the DNA profile data must be expunged.[11] California's proposed prohibition of collection until all appellate rights have been exhausted or waived[12] avoids the unnecessary extraction of samples that must later be expunged and protects the privacy of those wrongfully convicted. Any delay occasioned by waiting until the disposition of an appeal is not burdensome; those subjected to mandatory data bank profiling (convicted murderers, rapists, and other violent felons) are likely to be serving long prison terms and thereby pose no threat to society while they are incarcerated during the appellate process.

The Legislature has mandated strict privacy and confidentiality standards. DNA records are to be released only to authorized agencies, upon written notice, to assist with a criminal investigation or the identification of missing persons.[13] Records may also be released to the defendant in connection with a case in which he or she is charged and, after personally identifiable information has been removed, to an entity authorized to maintain population statistics.[14]

Confidentiality of all test results is mandated and release to insurance companies, employers, health care providers, employment screening or personnel agencies, private investigators, and private corporations is prohibited.[15] Although unauthorized disclosure is subject to criminal sanction, the authorized penalty—a class A misdemeanor punishable by up to one year in prison and a fine of not more than $10,000—is not commensurate with the potentially destructive consequences of disclosure of an individual's genetic profile.[16]

Despite these concessions to confidentiality, the potential for abuse of Index data exists and will be fully appreciated only as the profiling program is developed and utilized. In order to

[11] Exec. L. § 995-c(9).

[12] McEwen & Reilly, *supra* note 3, at 947.

[13] Exec. L. §§ 995-c(6)(a), 995-b(9)(viii).

[14] Exec. L. § 995-c(6). The statute authorizes the use of anonymous samples to create reference data banks for population frequency calculations, research and development, and quality control.

[15] Exec. L. § 995-d(1).

[16] Exec. L. § 995-f. Florida and Georgia make it a felony offense to obtain or attempt to obtain data bank samples without authorization. McEwen & Reilly, *supra* note 3, at 952.

protect those subjected to the mandatory testing against intrusive and potentially discriminatory scrutiny by the state, the Index must be subject to stringent oversight.[17]

[4] Responsible Use of the Science

In its 1992 Report, the NRC cautioned that the viability of DNA data banks is inextricably linked with the proper use of the technology.[18] "Proper use" implicates not only procedural safeguards to ensure confidentiality and narrowly defined parameters for the use of data, but also includes measures designed to guarantee the reliability of the testing results. In many respects, the New York Legislature heeded the NRC's warnings. The Commission and the DNA subcommittee are required to review appropriate scientific procedures for the development and implementation of the Index; the statute mandates that these committees be staffed with forensic scientists, molecular biologists, population geneticists, and representatives from the criminal justice community, individuals whose professional knowledge would presumably ensure the use of appropriate scientific procedures and safeguards.

However, with regard to proficiency testing, an essential aspect of any quality control program for DNA data banks, the statute is equivocal. Exec. L. § 995-b(3)(b) mandates routine internal and external proficiency testing of all laboratories performing DNA analysis for the Index. But blind proficiency testing is required only if deemed "practicable and appropriate" by the DNA subcommittee. This determination is to be based on such factors as the accuracy and reliability of the laboratory results, cost-effectivenes, time, allocation of resources, and availability. This limitation on blind proficiency testing greatly compromises effective oversight of laboratories conducting DNA testing. As Judge Kaye's concurrence in *Wesley* suggests, self-validation and review by laboratories is not an ideal means for assessing their reliability. Blind proficiency testing is the most reliable means for assessing laboratory quality and error rates. As with all effective quality assurance regimens, a

17 See Janet Hoeffel, *The Dark Side of DNA Profiling: Unreliable Scientific Evidence Meets the Criminal Defendant*, 42 Stanford L. Rev. 465, 535-36 (1990), for discussion of the potential for genetic discrimination posed by DNA data bank legislation.

18 National Research Council, DNA Technology in Forensic Science Ch. 6 (National Academy Press 1992) [hereinafter NRC Report].

program of blind proficiency testing is essential despite its grea expensive.

[5] Procedural Issues Raised by the Index

The Index raises a number of questions regarding the defendant's right to challenge the results of a profile match, the use of this evidence during a criminal prosecution, and its admissibility in court. Although *Wesley* stands for the proposition that evidence of RFLP testing is admissible in court, it sheds no light on the far more complex evidentiary issues raised by the Index.

The statute requires the Commission to develop procedures for ensuring subjects of the Index access to review their records and challenge the accuracy of the test results.[19] There is no provision that specifically links this right to the discovery requirements of C.P.L. § 240.20, governing defense discovery in criminal proceedings. In addition, the legislation does not set forth rules governing when the defense must be given notice that DNA and Index evidence will be used by the prosecution. The need for these rules may require an amendment to C.P.L. Article 710, governing motions to suppress and notice to the defendant of the prosecution's intent to offer evidence. The Index regulations ultimately promulgated should also provide for immediate notice to an individual who is a suspect on the basis of a profile match and prompt access to examination of data bank records. Defense counsel must demand this access and move for sanctions when incomplete or untimely information is disclosed. Additionally, requests for exculpatory material should be made, including access to the crime scene evidence tested and the right to search the Index to determine whether other profiles in its data bank also match biological specimens recovered from the crime scene.

The statute does not specifically address the circumstances under which a stored DNA profile would be admissible at trial or whether a jury should be apprised of any information connecting the defendant to the Index. Some states' statutes authorize the admission in court of DNA data "collected specifically for the data bank"; others use match evidence as an investigative tool and do not permit its admission as substantive evidence.[20] This more prudent approach is advisable.

19 Exec. L. § 995-b(9).

20 McEwen & Reilly, *supra* note 3, at 950, 955.

Evidence that a defendant became the subject of a criminal investigation based on a match between crime scene evidence and a data bank profile severely prejudices a defendant: the jury will inevitably conclude that the defendant has a criminal record that resulted in his or her being subject to the Index.

Deeming a match between crime scene evidence and a data base profile to be merely the starting point in an criminal investigation protects the suspect's interests and does not prejudice the state in any way. A match could be the basis for probable cause to draw a new confirmatory sample from a suspect. The suspect would thus be afforded greater procedural safeguards and access to counsel, who would be vigilant in ensuring laboratory compliance with protocol. This would eliminate the need for subsequent frivolous motions and aid in protecting against erroneous test results.

The Index legislation is silent on a number of other legal issues likely to be raised as profiles are used in criminal investigations and DNA evidence becomes more widespread. For example, is it permissible to make mandatory DNA testing a condition of a plea bargain to a lesser charge? Are indigent criminal defendants entitled to court funds for independent pretrial and post-conviction DNA testing? There are other related and critical areas that should be addressed in future legislative amendments to the Criminal Procedure Law. Perhaps most important is an explicit requirement that biological evidence collected from a crime scene be preserved and made available to the defense for independent testing. An obligation should be imposed on law enforcement authorities and the prosecution to not only protect this evidence against contamination and tampering but also to preserve the evidence after trial, in the event a defendant wishes to pursue post-conviction DNA testing.

The Index appears to be intended only as an initial enabling piece of legislation. The Committee may find it necessary to address these areas as it develops regulations. These procedural issues are essential to the effective implementation of the Index and the fair use of DNA evidence against criminal defendants.

[6] Is Now the Time for Development of the Index?

Although methods of DNA profiling have evolved considerably over the last five years, this technology is only just beginning to be refined for forensic uses. Still being developed are

PCR based techniques that require smaller amounts of DNA, are less expensive to use, and are potentially easier to validate. It is estimated that the cost of performing an RFLP test and storing the necessary samples runs in excess of $120; this figure does not include the collateral expenses of actual collecting these samples and any litigation involving their use.[21] The NRC warns that RFLP-based technology should not be used in DNA data banks, as the obsolescence of this test is widely presumed.[22] Samples collected and typed using RFLP cannot be later converted to a different profiling system. The great expense and potentially limited utility of this DNA Index may counsel against its development at this time.[23]

[7] Conclusion

The recent notoriety of criminal cases implicating DNA technology has created the misleading illusion that DNA profiling will provide a long awaited crystal ball for law enforcement authorities. However, closer examination reveals that this new world of forensic science must be approached cautiously and responsibly. Merely because this science is now available does not mean that it is sufficiently reliable to be deployed on all fronts in the war on crime. Many DNA profiling techniques are still evolving, their trustworthiness uncertain. Furthermore, the costs of implementing a responsible and efficient DNA Identification Index are substantial and are unlikely to be justified by a significant increase in crime prevention.

As profiling technology advances and becomes more widely used, the scientific community, the law enforcement establishment, and the court system must grapple with the ramifications of such advanced forensics for the criminal justice system in general as well as for the rights of the accused. Both the Court of Appeals decision in *Wesley* and the Legislature's enthusiasm for DNA data banking may confer legitimacy on a science still in its developmental stages. If this nascent science is prematurely embraced, the values of due process and individual

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[21] Scheck, *DNA Data Banking: A Cautionary Tale*, *supra* note 8, at 931.

[22] "We expect current methods to be replaced soon with techniques that are simpler, easier to automate, and less expensive—but incompatible with existing DNA profiles." NRC Report, *supra* note 18, at 19-20.

[23] The State of Louisiana was compelled to discontinue its ambitious plans for a DNA data bank after its cost was deemed prohibitive. McEwen & Reilly, *supra* note 3, at 959.

liberty will be compromised for the sake of expediency in law enforcement. It is likely that both the Court of Appeals and the state legislature will revisit these issues in the near future.

§ 7 Chapter 737 of the Laws of 1994

AN ACT to amend the executive law and the criminal procedure law, in relation to creating the commission on forensic science and the establishment of a DNA identification index

Became a law August 2, 1994, with the approval of the Governor. Passed on message of necessity pursuant to article iii, section 14 of the Constitution by a majority vote, three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. The executive law is amended by adding a new article 49-B to read as follows:

ARTICLE 49-B

COMMISSION ON FORENSIC SCIENCE AND ESTABLISHMENT OF DNA IDENTIFICATION INDEX

Section **995. Definitions.**
995-a Commission on forensic science.
995-b Powers and duties of the commission.
995-c State DNA identification index.
995-d Confidentiality.
995-e Applicability.
995-f Penalties.

§ 995. Definitions.

When used in this article, the following words and terms shall have the meanings ascribed to them in this section:

1. For purposes of general forensic analysis the term "forensic laboratory" shall mean any laboratory operated by the state or unit of local government that performs forensic testing on evidence in a criminal investigation or proceeding or for purposes of identification provided, however, that the examination of latent fingerprints by a police agency shall not be subject to the provisions of this article.

2. For purposes of forensic DNA analysis, the term "forensic DNA laboratory" shall mean any forensic laboratory operated by the state or unit of local government, that performs forensic

DNA testing on crime scenes or materials derived from the human body for use as evidence in a criminal proceeding or for purposes of identification and the term "Forensic DNA testing" shall mean any test that employs techniques to examine deoxyribonucleic acid (DNA) derived from the human body for the purpose of providing information to resolve issues of identification. regulation pursuant to this article shall not include DNA testing on materials derived from the human body pursuant to title five of article five of the public health law for the purpose of determining a person's genetic disease or medical condition and shall not include a laboratory operated by the federal government.

3. "DNA testing methodology" means methods and procedures used to extract and analyze DNA material, as well as the methods, procedures, assumptions, and studies used to draw statistical inferences from the test results.

4. "Blind external proficiency testing" means a test sample that is presented to a forensic laboratory for forensic DNA testing through a second agency, and which appears to the analysts to involve routine evidence submitted for forensic DNA testing.

5. "DNA" means deoxyribonucleic acid.

6. "State DNA identification index" means the DNA identification record system for New York state established pursuant to this article.

7. "Designated offender" means a person convicted of and sentenced for any one or more of the following felonies as defined in the penal law: sections 120.05, 120.10, and 120.11, relating to assault; sections 125.15 through 125.27 relating to homicide; sections 130.25, 130.30, 130.35, 130.40, 130.45, 130.50, 130.65, 130.67 and 130.70, relating to sex offenses; sections 205.10, 205.15, 205.17 and 205.19, relating to escape and other offenses, where the offender has been convicted within the previous five years of one of the other felonies specified in this subdivision; or section 255.25, relating to incest.

8. "DNA record" means DNA identification information prepared by a forensic DNA laboratory and stored in the state DNA identification index for purposes of establishing identification in connection with law enforcement investigations or supporting statistical interpretation of the results of DNA

analysis. A DNA record is the objective form of the results of a DNA analysis sample.

9. "DNA subcommittee" shall mean the subcommittee on forensic DNA laboratories and forensic DNA testing established pursuant to subdivision thirteen of section nine hundred ninety-five-b of this article.

10. "Commission" shall mean the commission on forensic science established pursuant to section nine hundred ninety-five-a of this article.

§ 995-a. Commission on forensic science.

1. There is hereby created in the executive department, the commission on forensic science, which shall consist of the following fourteen members: (a) the commissioner of the division of criminal justice services who shall be chair of the commission and the commissioner of the department of health or his or her designee, who shall serve as an ex-officio member of the commission;

(b) twelve members appointed by the governor.

2. Of the members appointed by the governor,

(a) one member shall be the chair of the New York state crime laboratory advisory committee;

(b) one member shall be the director of a forensic laboratory located in New York state;

(c) one member shall be the director of the office of forensic services within the division of criminal justice services;

(d) two members shall be a scientist having experience in the areas of laboratory standards or quality assurance regulation and monitoring and shall be appointed upon the recommendation of the commissioner of health;

(e) one member shall be a representative of a law enforcement agency and shall be appointed upon the recommendation of the commissioner of criminal justice services;

(f) one member shall be a representative of prosecution services who shall be appointed upon the recommendation of the commissioner of criminal justice services;

(g) one member shall be a representative of the public criminal defense bar who shall be appointed upon the recommendation of an organization representing public defense services;

EXHIBIT B3

APPROVAL # 75

36 pgs.

CHAPTER 737

LAWS OF 19 94 _____ MEMORANDUM NO. _____

SENATE BILL _____ ASSEMBLY BILL 12252

12252

IN ASSEMBLY

July 2, 1994

Introduced by COMMITTEE ON RULES -- (at request of M. of A. Lentol, Silver, Matusow, Destito, Bianchi, Gunther, Hickey, Magee) -- read once and referred to the Committee on Codes

AN ACT to amend the executive law and the criminal procedure law, in relation to creating the commission on forensic science and the establishment of a DNA identification index

IN THE SENATE BY S 8897 Volker

DATE RECEIVED BY GOVERNOR:

7/22

ACTION MUST BE TAKEN BY:

8/3

DATE GOVERNOR'S ACTION TAKEN:

AUG 2 1994

STATE OF NEW YORK
EXECUTIVE CHAMBER
ALBANY 12224

AUG 2_ 1994

MEMORANDUM filed with Assembly Bill Number 12252, entitled:

CHAPTER 737
APPROVAL # 75

"AN ACT to amend the executive law and the criminal procedure law, in relation to creating the commission on forensic science and the establishment of a DNA identification index"

A P P R O V E D

The bill adds a new Article 49-B to the Executive Law creating a Commission on Forensic Science and authorizing establishment of a DNA Identification Index.

Concerns regarding the lack of regulation of forensic services were brought to the forefront with the introduction of this new and complex technique of forensic DNA analysis. There are no existing federal or State regulations applicable to forensic DNA analysis; the admissibility of DNA test results in judicial proceedings is generally decided on a case-by-case basis. Our Court of Appeals recently held in People v. Wesley, that forensic DNA evidence was admissible and that courts in the future could take judicial notice of the admissibility of forensic DNA Restriction Fragment Length Polymorphism (RFLP) analysis.

The bill, included as a component of my Sara Anne Wood Child Protection Agenda, represents landmark legislation for the nation as it provides for the establishment of minimum standards and an accreditation program for forensic services in New York. The Commission on Forensic Science, comprised of 14 members representing forensic science, laboratory standards and regulation, prosecution, defense, law enforcement, the Legislature and the Judiciary, will study and evaluate this long overlooked but critical component of our criminal justice system.

An early study of this new technology, under the auspices of the Commissioner of the Division of Criminal Justice Services (DCJS), resulted in the establishment of a DNA Scientific Review Board to evaluate the scientific principles associated with this technique and to review voluntary guidelines for DNA analysis. Employing this same framework, the bill establishes a DNA subcommittee to review accreditation standards for forensic DNA analysis and make binding recommendations to the Commission concerning such standards.

To harness the extraordinary investigative potential of this identification technique, the bill authorizes the establishment of a state DNA identification index within DCJS and the collection of blood samples from offenders convicted of certain assault, homicide and sex offenses. New York joins twenty-six other states which have enacted DNA databank statutes. Significantly, with such a law, New York can now participate in the national DNA identification system, known as CODIS, developed by the Federal Bureau of Investigation to enable federal, state and local law enforcement agencies to share DNA information when investigating sex offenses and violent crime.

Building upon the foundation and minimum guidelines recommended by the DNA Scientific Review Board, the bill's unprecedented creation of the Commission on Forensic Science, coupled with its specific proscriptions governing the State DNA identification index and use of DNA records, ensures a reasoned approach to the implementation of forensic DNA technology in New York.

The bill is approved.