

The DNA Wars: Part I

Genetic Witness: Science, Law, and Controversy in the Making of DNA Profiling

Author: Jay D. Aronson
Rutgers University Press (2007)
270 pp., \$23.95, paperback.

DNA technology is now widely used in most developed countries for the investigation of serious crimes, for identification of recovered human remains, and for humanitarian family reunifications. Nothing about the laboratory or statistical methods used in forensic DNA analysis is truly revolutionary in terms of the major paradigm shifts described by Thomas Kuhn (*Structure of Scientific Revolutions*). Nevertheless, the use of DNA-based technologies that began in the late 1980s has truly revolutionized the way that our society and our courts view all manner of scientific evidence presented by expert witnesses. In the U.S. alone, more than 200 persons serving lengthy prison sentences have been exonerated or had convictions vacated on the sole basis of postconviction DNA-based testing of evidence collected before the modern era. This has led to a reexamination of death-penalty statutes and to a much needed closer scrutiny of many other areas of forensics including fingerprint, firearm, and tool-mark comparisons, as well as document and handwriting analyses.

Because of the power of DNA evidence as both an exculpating and an inculpating tool, the road to its acceptance in U.S. courtrooms has not been a smooth ride in the adversarial U.S. justice system. In *Genetic Witness*, author Jay Aronson traces the early history of the use of DNA-based analyses for comparison of biological crime-scene evidence to the DNA patterns from known sources. He explores this history in the context of lessons learned about reforming problems in forensic laboratories by identifying both the limitations in the laboratory practice itself and in the interpretation of results.

The book itself is an updated version of Aronson's doctoral dissertation in the Department of History of Science and Technology at the University of Minnesota.

Its content is based largely on oral-history interviews that Aronson conducted with scientists and attorneys when he was a predoctoral student (2001–2003) and post-doctoral fellow (2003–2004). In addition to the oral-history interviews, the author also used archival records from the National Academy of Sciences National Research Council Commission on Life Sciences, various amicus briefs, court documents, and other private files shared with him by attorneys and DNA scientists. He also

consulted records of U.S. Congressional hearings and correspondence, trial transcripts, and publicity materials from private commercial forensic laboratories.

The book is well written and organized into nine chapters. At the end of the book, there are endnotes to references and citations to sources, a bibliography containing cites to legal cases, oral-history interviews, and published materials, and an alphabetized index. The book contains five figures.

After an introductory chapter, Aronson traces the first uses by British geneticist Alec Jeffreys, in the mid-1980s, of RFLP-based methods to settle questions about family relationships; such uses were therefore helpful in immigration disputes. He summarizes Joseph Wambaugh's popular account (*The Blooding*) of the first criminal investigation, using Jeffreys's DNA methods, to solve the UK investigation of the assault and murder of two young girls, Lydia Mann and Dawn Ashworth. The author then describes some of the early history of the first commercialization of forensic DNA testing by the companies Cellmark and Lifecodes. Included in this chapter is a very basic description of early methods of DNA "fingerprinting" and some of the statistical background used for calculating the probability of a random match between profiles from two samples. The section on "How does DNA profiling work?" focuses only on the very early use of RFLP-based Southern-blot technology for DNA-based human identification. Although clearly important to the historical theme of the book, such methods have not been in use for identity testing in over a decade. There are many other compelling scientific and policy issues to be resolved with current and future methods of forensic DNA testing, and it is unfortunate that the author did not choose to address these in any substantive detail either in this chapter or elsewhere in the book.

Chapters 3 and 4 review several of the first legal challenges to courtroom admissibility of DNA evidence in the U.S. Aronson describes the 1988 meeting of criminal-defense attorneys Scheck and Neufeld with scientists at a Banbury Center conference at the Cold Spring Harbor Laboratory in New York. During a break at this meeting, Neufeld and Scheck reviewed some autoradiograms from one of their cases, *People of New York v. Castro* (545 N.Y.S.2d 985, 1989), with scientists attending the meeting. This review ultimately led to a fresh look by Judge Sheindlin at the Frye admissibility standards when applied to inclusionary and exclusionary DNA results. Even though the court ruled some of the DNA evidence to be inadmissible in this case, in September of 1989 Joseph Castro pled guilty to the murder of Vilma Ponce and her 2-year-old daughter. The *Castro* case and the media attention that came with it, both in the

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DOI 10.1016/j.ajhg.2008.08.008. ©2008 by The American Society of Human Genetics. All rights reserved.

popular press and in stories in *Science* and *Nature*, set the stage for the so-called “DNA wars” that soon followed in courtrooms throughout the U.S.

Chapter 5 provides a very useful historical summary of the beginnings of efforts to systematically oversee and coordinate methods, procedures and interpretation guidelines across the U.S. in state, federal, and commercial laboratories. Even before the courtroom challenges to DNA in *Castro* and other cases, New York State had taken the lead as their Crime Laboratory Advisory Committee addressed a review of the technical, procedural, and interpretational standards used to evaluate DNA typing results in court. A 1989 report of the New York State Forensic DNA Analysis Panel resulted in an Executive law creating the NYS Commission on Forensic Science in 1994. This commission is composed of stakeholders in the criminal justice system, including defense attorneys and legal academics. Sadly, to this day, only a few other states or organizations (notably Connecticut, Virginia, the U.S. DOD, and a few others) have had the wisdom to appoint independent external DNA and legal experts to monitor various aspects of their forensic DNA and other laboratory operations.

Chapter 6 provides a thoroughly engaging history of some of the early courtroom dramas involving technical disputes among expert witnesses engaged by the prosecution and defense in the adversarial criminal justice system. A description is also included of the two *Science* papers providing opposing viewpoints on population genetics relating to statistical estimates of match probabilities. These two *Science* papers are considered classics in the annals of forensic DNA and are a must read for all students of the subject. Aronson also wrestles with the question of why certain scientists became partisans for one or another side in disputes over DNA typing. This is most certainly an important part of the history of the DNA wars. It remains disturbing to me that, to this day, some forensic-laboratory workers in police agencies openly view defense experts with great disdain, almost as if they believe that for some reason defendants don't have a right to a vigorous defense representation. This issue of integrity and unbiased expert witness testimony needs further exploration by Aronson and other historians of science in the courtroom because without honest and impartial expert witnesses, our juries cannot hope to make fair and equitable deliberations.

Chapter 7 reviews the history of the two reports on DNA technology in forensic science published in 1992 and 1996 by committees of the National Research Council. Aronson ably summarizes the nuanced debate over the so-called “ceiling principle” advocated in the first NRC report for statistical calculations and later deemed to be unnecessary by authors of the second report. These two NRC reports are on the shelves of most forensic DNA scientists and should be studied in depth by anyone professionally involved with DNA forensics and the courts. The next chapter largely is devoted to a description of the trial of O.J. Simpson for the murder of his wife, Nicole,

and her friend Ron Brown. In its own tragic way this trial was, in Aronson's words, “DNA's prime time debut.” In this trial, the defense did not successfully attack the validity of DNA technology itself but, rather, the way that the evidence was collected.

In the final chapter, Aronson describes some of deficiencies identified in forensic laboratories in which errant workers have allegedly tainted evidence or misinterpreted laboratory results through, presumably, either willful or mistaken errors of omission or commission. He describes part of the 2002 FBI's Office of the Inspector General Report in the aftermath of problems identified in cases handled by one FBI scientist. It is an important document to read for all those concerned with the possibility of laboratory negligence. It is clear to all who work in diagnostic or forensic laboratories that oversight and openness are crucial to good work and to gaining the public trust. It would have been useful for Aronson to have commented on the education and training of the practitioners of forensics. Although there are indeed careful standards and guidelines for the education and training requirements of the laboratory practitioners of forensic DNA science, there remains no national or state licensing requirement that involves a national or state examination. This is notable and conspicuous because all manner of individuals entrusted with the public good, from lawyers and physicians to plumbers and electricians, must take and pass written examinations for licensing. Although the American Board of Criminalistics offers such examinations in a variety of subject fields, it is optional and, in my experience, quite rare to find someone in most state, federal, or commercial crime laboratories who has such certification.

Genetic Witness is an important contribution to the history of DNA in the courtrooms of America. Although published just last year, it is unfortunately somewhat dated. It was, to be fair, written several years ago—on the basis of earlier print sources and oral-history interviews performed in the first half of this decade—relating to work with older technologies not currently in use. Although in Chapter 8 the author briefly describes some of the current PCR-based detection of genetic variants such as short tandem repeats, other new technologies such as single-nucleotide polymorphism detection, or direct DNA-sequencing methods used for mtDNA analysis, are not reviewed. Results of DNA analysis using these methods also can be problematic and controversial, especially relating to DNA-mixture interpretation and analysis of trace samples. Therefore, Aronson's book will be of diminished practical value to those seeking to understand current methods and procedures utilized worldwide for DNA-based forensic identity testing. The book does, however, serve as a very useful guide for those who wish to become familiar with some of the social and legal history relating to early use of DNA technology in the courtroom.

It is this reader's hope that Professor Aronson will continue to monitor the modern history of DNA science as applied to the intersection of science, law, and policy. It promises to be

a history rich in both excitement and controversy as policy questions are already upon us relating to expansion and data mining of DNA data banks, genetic privacy, phenotype prediction, and biogeographic ancestry determination.

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