

Kaye, David H. *The Double Helix and the Law of Evidence*. Cambridge, Mass.:Harvard University Press, 2010. 352p. \$45.

*Reviewed by Frances M. Brillantine*

¶34 For many of us, the 1995 O.J. Simpson trial was our first real introduction to the use of DNA as evidence. As David H. Kaye demonstrates in his new book, *The Double Helix and the Law of Evidence*, genetic evidence actually has a much longer history, one that began in the 1930s with the cases that first introduced ABO blood typing to the nation's courts.<sup>15</sup> Professor Kaye, an expert on scientific evidence and the use of statistics in law, is Distinguished Professor of Law, Weiss Family Faculty Scholar, and a member of the graduate faculty in the department of forensic science, all at Pennsylvania State University. He has written numerous books and articles, including contributions to four editions of both *McCormick on Evidence*<sup>16</sup> and *Modern Scientific Evidence*.<sup>17</sup> In *The Double Helix*, Kaye draws on evidence law, genetics, and statistics to detail the history of DNA and earlier forms of genetic evidence and to investigate the legal and scientific controversies that have surrounded both. He also discusses current and emerging issues in DNA evidence, focusing on the interpretation of mixtures containing DNA from multiple persons and on the analysis of low copy number samples—small samples involving relatively few copies of an individual's genetic code.

¶35 *The Double Helix* is well organized, with a helpful time line of key scientific and legal developments and a list of relevant cases and statutes. The notes are detailed, and the index is thorough. Unfortunately, the book lacks a glossary, and one would be helpful, as the more scientific portions of the book—though largely accessible to the nonscientist—are nonetheless complex. Chapters generally explore the science and statistical reasoning behind specific developments in forensic genetics and include case histories and analogies that demonstrate and clarify the scientific issues. The book's preliminary chapters focus on the various genetic markers, such as blood type, that were in widespread use prior to the advent of DNA evi-

---

<sup>15</sup> See, e.g., *State v. Damm*, 266 N.W. 667 (S.D. 1936) (recognizing as scientifically valid the use of blood type to disprove paternity, while nonetheless affirming the exclusion of blood type evidence in the case at bar).

<sup>16</sup> The most recent is KENNETH S. BROUN ET AL., *MCCORMICK ON EVIDENCE* (6th ed. 2006).

<sup>17</sup> The most recent is DAVID L. FAIGMAN ET AL., *MODERN SCIENTIFIC EVIDENCE* (2007–2008 ed. 2007).

dence and on the standards developed by courts for deciding when to admit such markers as evidence. Kaye also discusses mathematical frequency and probability and the abuses that occurred when probabilities derived from genetic evidence were introduced in courts.

¶36 In 1984, Sir Alec John Jeffreys discovered “DNA fingerprinting” (p.50) and the world of forensic science changed forever. To place this discovery in context, Professor Kaye explains the nature of DNA, describes early DNA typing, and details two difficult criminal cases resolved through the use of DNA analysis. By the late 1980s, courtroom disputes over the regular use of DNA typing had spread into the scientific and academic communities. Kaye demonstrates how the resolution of such disputes over genetic profiling, probability, and population genetics helped contribute to the admissibility of DNA evidence in future cases. Of particular interest is the admissibility of the random-match probability, which purports to measure the likelihood that someone picked randomly from the general population would happen to possess a particular DNA profile. Kaye discusses this issue in detail, devoting a full chapter to the O.J. Simpson case, still considered the apex of arguments against allowing DNA evidence.

¶37 Tremendous advances have been made in genetic technologies since the *Simpson* case, but concerns about DNA evidence still exist. Professor Kaye explains the science behind these advances and describes how they solve some problems but give rise to others. Most disquieting among the new challenges are the use of racial categories to estimate random-match probabilities and the challenge of unraveling the jumbled mixtures of DNA sometimes found at crime scenes. Kaye offers various ideas for addressing these issues, such as the use of likelihood ratios in identifying combinations of DNA. One particularly interesting technological advance involves the use of mitochondrial DNA (mtDNA), a development that began to impact forensic science in the late 1990s. Since mitochondrial genetics are passed directly from mother to child, mtDNA is particularly useful for establishing membership in a family. It is also used where only old, degraded, or small tissue samples are available. Professor Kaye presents fascinating examples of how mtDNA has been used to establish family connections and to associate suspects with human hairs found at crime scenes.

¶38 So, in the end, what can we learn from the courts’ experience with genetic evidence? Kaye concludes with a general discussion on the integration of science into law, the increasing speed with which new technologies are introduced and accepted by courts, and the various means by which these processes might be improved. Although the book closes without reaching many important topics, such as the issues involved in acquiring DNA samples or the creation of a national DNA database, Professor Kaye promises to address these and related issues in another, forthcoming book.

¶39 *The Double Helix* is a fascinating account of the complex history of genetic evidence. Professor Kaye clearly explains the science and statistics behind genetics, and the compelling examples he pulls from both civil and criminal cases provide valuable context to his explanations. The book is recommended not only for academic libraries, but also for individual lawyers and judges.