Fermilab into the era of megascience—"a bigger big science shaped by restricted funding for physics after about 1970" (p. 262). Under this new form of research, experimental programs continued to operate for decades or more, as physicists struggled to survive in the smaller and more competitive funding environments of the 1980s. Under Lederman, Fermilab crucially contributed to the discovery of the top quark and elaborated plans to expand its research program by participating in the proposed Superconducting Super Collider (SSC). The demise of the SSC shattered that dream and raised new doubts about the laboratory's relevance and its future.

Throughout their discussion of the laboratory's history, the authors turn to the organizing metaphor of the "frontier." The proton synchrotron, they argue, has parallels in the tools of the early American West—axe, spyglass, plough. These were used to explore and harness the geographical frontier, just as the accelerator did for the frontiers of physics. Driving explorers forward in both cases was the internal drive to push into unknown territories; holding them back were social and economic constraints. The metaphor is powerful and useful when dealing with the early vision of the laboratory—its radical democracy, its ingenuity and frugality, its potential as an instrument for social transformation. (Wilson, for instance, lent the laboratory's prestige to support civil rights in Illinois and the campaign for open housing.) As the story progresses, however, the metaphor becomes perhaps too flexible, invoked to explain everything from the SSC as an "outpost" to the unexplored "frontiers" inside the atom. In this way, it loses purchase on the particularities of Fermilab and of high-energy physics in the 1970s and 1980s more generally. The impulse behind it, though—the attempt to understand Fermilab as part of the history of the United States in the late twentieth century—is one of the strongest and most valuable contributions of the book. Meticulously researched and full of fascinating details, *Fermilab* will inspire others to take up where the authors have left off.

EDWARD JONES-IMHOTEP

Michael Lynch; Simon A. Cole; Ruth McNally; Kathleen Jordan. *Truth Machine: The Contentious History of DNA Fingerprinting*. xxii + 391 pp., illus., bibl., index. Chicago/London: University of Chicago Press, 2008. $37.50 (cloth).

Unless you have never seen an episode of *CSI: Crime Scene Investigation*, or similar TV shows, you probably know that DNA fingerprinting, unlike the notoriously fallible eyewitness, is conceived of as a "truth machine" that reaches its conclusions objectively, without racial, gender, and other subjective biases. It is this ideal vision of justice obtained that the authors of *Truth Machine: The Contentious History of DNA Fingerprinting* set out to examine, and their compelling conclusions make this superbly argued book well worth reading.

The authors' previous work includes pathbreaking ethnographic and sociological studies on scientific practices (Michael Lynch) and a history of fingerprints (those produced by oily fingers, not DNA) in criminal identification (Simon A. Cole). This book is not a history of DNA fingerprinting, as the subtitle states (such a history has been provided by Jay D. Aronson in *Genetic Witness: Science, Law, and Controversy in the Making of DNA Profiling* [Rutgers, 2007]), but, as the authors explain, a *sociological* history (p. xvi) of how the interaction between science and the law has turned DNA fingerprinting into a "truth machine." Indeed, if courts eventually reached agreement over the robustness of DNA fingerprinting, it was only after years of devising various "technical, legal and administrative fixes" (p. 228) in response to in-court challenges to the forensic use of DNA fingerprinting. In the best STS tradition, this book is a sophisticated and nuanced study that takes the very existence of the controversy as a key element in the controversy over the validity of DNA fingerprinting.

The authors base their arguments on more than sixty legal cases involving DNA fingerprinting (from the United States and the United Kingdom), a number of interviews, and publications by scientists, lawyers, and legal scholars (plus a couple of episodes of *CSI*). The method of using courtroom deliberation as a way to deconstruct scientific evidence used in court is now familiar to historians of science, but the authors give it an illuminating twist. Rather than viewing courtroom deconstruction as a "method for unmasking a reality that supposedly lies beneath the construction of expert evidence," the authors see it as "an interactional production" in which the method (deconstruction) and the result (factual claims) are both contested (p. 20).

The successful use of DNA fingerprinting in criminal cases depends on accurately answering two questions. First, is there a match between a DNA sample found at a crime scene and that of a suspected person? Second, how likely is it that this match is a random one—that is, that the DNA samples match but in fact belong to another person? What is missed in most popular

discussions of DNA fingerprinting is that, unlike our "finger fingerprints," our "DNA fingerprints" are not unique. Genomes are unique, but a DNA fingerprint represents only a tiny sample of a genome. Determining the likelihood of a random match involves complex speculation about the probability that another individual in a relevant population would have the same DNA fingerprint as the suspect. And in the definition of that "relevant population," as the authors so clearly show, assumptions about the suspect's characteristics—ethnicity, for example—will inevitably (re)enter, undermining the claim that DNA evidence speaks for itself.

But problems with DNA fingerprinting can also arise from the first step. A brilliant chapter expands the earlier work of two of the authors (Lynch and Kathleen Jordan) on local variations in experimental practices. There is the obvious risk that arises from incompetent or careless forensic scientists who perform messy DNA analysis. Yet even where conscientious scientists practice careful technique, the authors observe, scientific practices are inherently variable because written protocols are incapable of specifying practices unambiguously. Anyone who has worked in a laboratory knows the "magic" that is sometimes required to make an experiment work. But the acknowledgment of this fact in court will leave lawyers unimpressed and have disastrous consequences for the credibility of the evidence presented.

The detailed legal and scientific material presented in *Truth Machine* lends itself to other historical readings, as well. Since law and science are both fact-establishing institutions, the controversial history of DNA fingerprinting can also be read as a power struggle between these two institutions over the authority to determine the truth. Scientists who have testified in court have agreed that *in principle* this form of scientific evidence can establish facts with quasi-certainty. The law, for its part, has fought hard to define, and limit, exactly what experts may say in court and the parameters of expertise itself, from the 1923 case *Frye v. United States* to the 1993 *Daubert v. Merrell Dow Pharmaceuticals*, both discussed in the book. More fundamentally, courts have made sure that expert witnesses would not challenge their authority in deciding the issue of guilt or innocence.

Historians might miss some of the broader, if not longer, historical context to these debates. Indeed, the stellar rise of DNA fingerprinting to unprecedented authority in the late twentieth century took place during a period of great enthusiasm for the power of DNA in determining identity, behavior, and disease. The power of DNA seemed without bounds, and this undoubtedly lent a cloak of authority to DNA fingerprinting in courts. Also, the increasing distrust of jury impartiality, especially in race-related cases of violence in the United States, contributed to a climate where a greater reliance on evidence perceived to be objective was welcomed with relief.

The authors beautifully succeed in their project, a sociological history of DNA fingerprinting's rise to power. As they show so compellingly, DNA fingerprinting was not entirely immune to racial and other biases running through society because "'DNA' points the way to guilt or innocence only when it is surrounded by a story containing other claims and evidences" (p. 336). Thus, if much of the criticism against DNA fingerprinting discussed in this book might now seem obsolete because it was directed toward inadequate technical procedures that have since been improved, other key uncertainties will always remain because they result from the fact that both science and the law are human practices. This book does not try to debunk either science or the law. Rather, it takes a lucid and nuanced approach to show how science and the law *together* produced a relatively robust new form of evidence, if not one that should be treated as the kind of revealed truth that *CSI* viewers are so familiar with.

BRUNO J. STRASSER

Jo Marchant. *Decoding the Heavens: A Two-Thousand-Year-Old Computer—and the Century-Long Search to Discover Its Secrets.* 328 pp., illus., bibl., index. Cambridge, Mass.: Da Capo Press, 2009. $25 (cloth).

Jo Marchant's *Decoding the Heavens* is an approachable and enthralling tale of twentieth- and twenty-first-century attempts to decipher the Antikythera Mechanism. As a freelance journalist, Marchant provides an outsider's perspective on the history of science, and, with this volume, she introduces the Antikythera Mechanism to a popular audience.

Salvaged in 1901 from an ancient shipwreck off the Mediterranean island of Antikythera, the Antikythera Mechanism is unique. Constructed around 100 B.C., it is the most sophisticated piece of technology known from antiquity, and no geared mechanism of the same complexity arises in the historical record for another millennium. Approximately 315 x 190 x 100 mm in size and now consisting of eighty-two fragments, the mechanism contains thirty gears (Tony Freeth *et al.*, "Decoding the Ancient Greek Astronomical Calculator Known as the