

BOOK REVIEW

Lori E. Baker,¹ Ph.D.

Review of: *Forensic Biology: Identification and DNA Analysis of Biological Evidence*

REFERENCE: Li R. *Forensic biology: identification and DNA analysis of biological evidence*. Boca Raton, FL: CRC Press, 2008, 430 pp.

The author of this text, Richard Li, is an associate professor of forensic biology at the John Jay College of Criminal Justice of the City University of New York. Li has extensive experience teaching undergraduate students, as is apparent in his concise treatment of the history, key concepts, language, procedures, and techniques of forensic biology. The preface states that the text is written for an "undergraduate audience to provide a general understanding of forensic biology." Educators in this area will find the content succinct enough to be accomplished within a semester while introducing undergraduate students to the tools and vocabulary required to undertake more challenging material.

The text is divided into six sections totaling 24 chapters. Section I, Biological Evidence, includes three chapters. These chapters outline the common services of forensic laboratories in the United States and provide a brief history of the development of forensic biology. There is a summary of common sources of DNA and their reported success rates as well as basic biology of sources such as blood, hair, bone, and teeth with a discussion of the collection methods for biological evidence.

Section II, Essential Serology, includes two chapters. There is an overview of serological reagents, antibody binding and reactions with each concept clearly described with appropriate figures. Illustrated discussions of a variety of primary and secondary binding assays are also included.

Section III, Forensic Serology, contains five chapters. Presumptive and confirmatory assays for identification as well as species identification methods for sample screening are described. The biological characteristics techniques used for the identification of semen are outlined. In addition, assays for the identification of saliva and other biological fluids are discussed. Lastly, the background and forensic methods used for blood group typing and protein profiling is summarized.

Section IV contains six chapters on basic DNA techniques. There is an introduction to DNA with a reasonable explanation of the basic terminology, structure, and properties of human DNA. DNA extraction principles and methods are overviewed with a description of the main methods of DNA extraction used in forensic science as well as major issues such as exogenous DNA contamination and storage. DNA quantitation methods from slot blot assays to quantitative polymerase chain reaction (PCR) are described. Basic principles of PCR including factors that affect this application like low copy number templates, thermostable polymerases, contamination, and inhibitors are briefly mentioned. DNA

electrophoresis is described as well as detection methods that include the current standard for STR analysis.

Section V, Forensic DNA Profiling, consists of five chapters. Variable number tandem repeat (VNTR) profiling, beginning with the history and methodology of minisatellites is described including the benefits and drawbacks of restriction fragment length polymorphisms (RFLPs) and amplified fragment length polymorphisms (AFLPs). Microsatellite analysis, specifically the characteristics of short tandem repeats (STR) and their use in forensic analysis is then described with the common human STRs used in forensic casework and the challenges associated with these analyses. Y chromosome analysis and core loci are presented with the addition of sex testing using the amelogenin locus. The basics of single-nucleotide polymorphism (SNP) characteristics and analysis are outlined. Finally, mitochondrial DNA profiling applications and methods including interpretation of results in forensic testing are described.

The last section, VI Forensic Issues, is comprised of three important chapters. Chapter 22 outlines the issues of DNA databases. It lists national DNA databases of 11 countries and discusses the database applications, management, and searching capabilities of CODIS in particular. This chapter also briefly addresses the ethical issues surrounding the curation of this type of data and the searching capabilities. Chapter 23 covers the basic principles and statistics of genetics in order to assess the evaluation strength of forensic DNA results and match probabilities. Chapter 24 overviews issues of quality assurance and quality control in forensic DNA methods; it summarizes U.S. and international standards. Laboratory accreditation, validation, proficiency testing, and certification are all outlined.

While some of the serological procedures described are not currently widely applied due to advances of new techniques, the reader is given a holistic background and history of the development of forensic biology. The reader need not have a background in biology to understand the basis for the procedures and techniques as each are described in detail with ample visual aids. Indeed, there are figures or photographs on most pages to guide the reader. While the book does not go into great detail regarding each of the forensic serological methods, techniques, or protocols, it does provide a bibliography at the end of each chapter that is divided into sections and includes further in-depth studies and manuscripts regarding topical material. Study questions are provided at the end of each chapter to test the reader's comprehension which is useful for instructors. In addition, instructors using this book may request a CD containing PowerPoint lecture slides. This book highlights the important areas of forensic biology for an undergraduate reader.

¹Baylor University, Waco, TX 76798.