

Book Review

Genetics and DNA Technology: Legal Aspects, by Wilson Wall
Cavendish Publishing, 2004 (2nd Ed). ISBN 1859418937

This book aims to bridge an often-perceived gap between legal and scientific texts. Primarily intended for lawyers, law students and professionals with little or no scientific training, this book is written by a geneticist with considerable court experience. Drawing together the advances in DNA technologies and procedures, there is no assumption of prior knowledge in the field. This is an ideal starting point, from which a reader's understanding of other, more technical resources will be vastly improved.

The overlap between law and science is ever increasing. Lawyers and judges alike must be aware of the pertinent issues, and generally more than the rudimentary basics, of biology, genetics and basic chemistry. In addition, practitioners must also be sufficiently familiar with statistics in order to interpret the findings in today's multidisciplinary approach to identification. The application of DNA technologies to both criminal and civil investigations is addressed. At the most basic level, crime scene analysis generally relates to an unknown suspect and in civil cases, paternity testing will have one, or possibly more, known comparison samples. The choice of technology is influenced by the type of investigation and the limitations of each must be appreciated in order to present forensic evidence appropriately.

The first chapter covers the historical background to personal identification. Starting with the problems of accuracy and precision associated with the basic anatomical measurements known as Bertillonage, the progression of fingerprinting in the 20th century is discussed and the principles of basic blood grouping are presented. This introduction explains clearly why DNA technology is presented as the method of choice with a high discriminatory power, able to identify an individual within a higher degree of certainty from a large population of potentially matching candidates.

The notion of an 'ideal sample' is then considered in relation to forensic sampling, which is often overlooked in legal and scientific texts. The types of error, whether deliberate, inherent or accidental are all significant to the interpretation of evidence. These terms are presented plainly and accompanied by practical, useful examples. With an increased technological ability to amplify DNA from even a single cell, the potential for errors and mistakes is acknowledged, although further discussion or criticisms are needed to drive this message home, especially to the novice reader. Sample contamination and degradation are presented as fundamental issues which should be understood by all professionals who may only be remotely involved in sampling.

In the third chapter, the book returns to ABO, Rhesus and other blood groupings. Even though they are genetically derived, the use of blood analysis provides little information for positive, unique identifications. Mass screening, a cheap and speedy means to narrow down a large group of possible suspects, is the ideal situation for using these techniques to exclude numerous potential candidates. Although there is little probative value in traditional blood analysis, the text adequately describes the basic concepts to the reader. Certainly the use of diagrams in this, and subsequent

chapters, would have been an ideal enhancement to a second edition to illustrate the patterns of inheritance. For the novice reader, the use of visual representation, so commonly found in biochemistry textbooks, is lacking which may hinder their understanding of some simple yet integral concepts. For a more advanced audience, the lack of discussion regarding innovative research techniques throughout the text may be disappointing.

The fourth chapter analyses the DNA technologies one would expect in today's laboratories, and describes four approaches to extracting information from the variable regions of DNA. Firstly, the length of DNA fragments can be measured, once they have been restricted, or broken down into shorter pieces, using a variety of enzymes. Termed, RFLP (restriction fragment length polymorphisms), this process is criticised for the use of subjective measurements and uncontrollable variables. The use of multi-locus probes is described to increase the discriminatory power of this technique. Conversely, the second approach examines the variation within specific genes, which is less subjective: an indication of presence or absence is clearly expressed, although the discriminatory power is significantly lower. Again, descriptions such as the polymerase chain reaction (PCR) would be greatly improved with the use of diagrams, despite an interesting analogy between base sequences and knitting patterns. The third approach is the system of choice, making use of the variation in short tandem repeats. This has the added ability to differentiate samples based on sex although it is noted that contamination, a recurring theme in the book, is a serious source of error. Lastly, the direct analysis of base sequences is a technique envisaged for future forensic identification procedures. Single nucleotide polymorphism or 'snip' analysis, aided by the Human Genome Project, may perhaps yield physical characteristics of crime scene suspects, such as natural hair colour, nose shape or physical build. This futuristic approach to criminal investigations may be far on the horizon, however the redundancy of current 'short tandem repeat' databases for this technique is a valid point. As technology develops, the reliance upon our current and highly valued criminal justice databases may prevent the uptake of new techniques that employ different arrays of data.

The fifth chapter builds upon the basics already established to illustrate how the type of question influences the value of the answer. The use of statistics is pivotal. The null hypothesis, likelihood ratios and Bayesian prior probabilities are explained, although by this stage the true novice reader may well be lost. Reference to case law is limited throughout, occasionally citing *Nature* rather than the traditional law reports one would expect. This does have the benefit of providing the reader with a more scientific discussion of technology, which can then be read, if required, in conjunction with the more familiar law reports.

The final three chapters are brief and fail to comment on the more significant developments concerning DNA databases, cloning and genetic profiling. Disappointingly, there is little expansion or significant difference between this and the first edition from 2002. The plethora of new techniques and future technologies for the medical profession have already begun to require legal interventions in regulating the development of genetic research and will continue to do so. Whilst the preceding chapters provide the building blocks of legal aspects to DNA technologies, the title of the book may be somewhat misleading if the reader expects a comprehensive approach to all forms of technology.

In summary, this book provides a basic overview of the main techniques in traditional DNA analysis. The lack of academic weight may appeal to lawyers with little or no scientific grounding who wish to catch up with the ever-increasing pace of genetic research. The legal aspects of DNA technologies, in this text, are restricted to paternity testing and criminal identifications. The author devotes little attention to the medico-legal developments in therapeutic cloning and research, which is undoubtedly covered in other texts, but remains a significant failing in this edition.

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