


# **The Future of Forensic DNA Testing**

*Predictions of the Research and  
Development Working Group*



**National Commission on the Future of the DNA Evidence  
National Institute of Justice  
U.S. Department of Justice**

# Future Of Forensic Dna Testing The Predictions Of The Research And Development Working Group

**Norah Rudin, Keith Inman**



## **Future Of Forensic Dna Testing The Predictions Of The Research And Development Working Group:**

The Future of Forensic DNA Testing ,2000 A report from National Commission on the Future of DNA Evidence Cover  
The Future of Forensic DNA Testing U.s. Department of Justice,Office of Justice Programs,National Institute of Justice,2012-07-18 The principal assignment given to the Research and Development Working Group was to identify the technical advances in the forthcoming decade and to assess the expected impact of these on forensic DNA deoxyribonucleic acid analysis Progress in forensic analysis was slow until recently but since 1985 more powerful techniques have increased explosively The first useful marker system the ABO blood groups was discovered in 1900 The second the MN groups came a quarter century later By the 1960s there were 17 blood group systems known but not all were useful for forensics and in the 1970s a few serum proteins and enzymes were added By the 1980s some 100 protein polymorphisms were known but most were not generally useful for forensics The year 1985 brought a major breakthrough VNTRs variable number of tandem repeats showed much greater variability among people than previous systems and immediately began to be used for forensic studies They are still used but are rapidly being replaced by STRs short tandem repeats We can also expect improvements in collection and purification techniques Automation will make the process more efficient and rapid and we expect interpretative software for analysis of complex problems such as mixtures There also is progress toward miniaturization using a combination of chip technology and molecular genetics Portable handheld systems are now working in laboratory experiments how soon these will be available for routine use is not clear We also expect an increasing amount of re examination of cases in which the conviction was based on evidence other than DNA Greater automation and higher throughput approaches will help reduce the backlog Formats that can analyze multiple STR loci in miniaturized mobile instruments are promised and should be available by this time We also expect improved sampling and storage techniques Research in the human genome and clinical research will produce many more markers some of which will be used to supplement the existing procedures We also expect integration of computers and internet with analytical techniques to permit direct transmission of test data between laboratories There may be some transition to new technologies mainly to supplement the standard STRs SNPs will be widely used in medical and agricultural research so there will be many opportunities to carry these over for forensic purposes Within 10 years we expect portable miniaturized instrumentation that will provide analysis at the crime scene with computer linked remote analysis Although this report looks to the future we emphasize that current state of the art DNA typing is such that the technology and statistical methods are accurate and reproducible STRs have proved to be very satisfactory for forensic use and are being rapidly adopted by forensic laboratories The difficulty and expense of changing well established and reliable procedures will inhibit changes to other systems For this reason we believe that STRs will be the predominant procedure during the next decade Methods of automation increasing the speed and output and reliability of STR methods will continue In particular we expect that portable miniature chips will

make possible the analysis of DNA directly at the crime scene Techniques for handling minute amounts of DNA or DNA that is badly degraded will become much better In particular mitochondrial DNA will probably play an increasing role in such difficult cases Databases of DNA profiles of convicted felons will be extensive and coordinated throughout the States International comparisons will be feasible and increasingly common In the future it is likely that an increasing number of suspects will be identified by database searches The statistical interpretation is difficult particularly if future databases include representatives of the population at large rather than convicted felons The Future of Forensic DNA Testing ,2000

**The Future of Forensic DNA Testing** ,2000 **Forensic Biology** Richard Li,2015-03-11 Focusing on forensic serology and forensic DNA analysis this book introduces students to the methods and techniques utilized by forensic biology laboratories Using schematic illustrations to clarify concepts this second edition explores the latest DNA profiling tools contains three new chapters and provides 200 new images It also includes new tables for many chapters Covering the full scope of forensic biology the book uses an accessible style designed to enhance students education and training so they are prepared both in the laboratory and in the field **DNA and the Criminal Justice System** David Lazer,2004 Examines the impact of DNA technology on issues of ethics civil liberties privacy and security *Advanced Topics in Forensic DNA Typing: Methodology* John M. Butler,2011-07-27 Intended as a companion to the Fundamentals of Forensic DNA Typing volume published in 2009 Advanced Topics in Forensic DNA Typing Methodology contains 18 chapters with 4 appendices providing up to date coverage of essential topics in this important field and citation to more than 2800 articles and internet resources The book builds upon the previous two editions of John Butler s internationally acclaimed Forensic DNA Typing textbook with forensic DNA analysts as its primary audience This book provides the most detailed information written to date on DNA databases low level DNA validation and numerous other topics including a new chapter on legal aspects of DNA testing to prepare scientists for expert witness testimony Over half of the content is new compared to previous editions A forthcoming companion volume will cover interpretation issues Contains the latest information hot topics and new technologies Well edited attractively laid out and makes productive use of its four color format Author John Butler is ranked as the number one high impact author in legal medicine and forensic science 2001 to 2011 by ScienceWatch com

Forensic DNA Evidence Interpretation John S. Buckleton,Jo-Anne Bright,Duncan Taylor,2016-04-21 Now in its second edition Forensic DNA Evidence Interpretation is the most comprehensive resource for DNA casework available today Written by leaders in the fields of biology and statistics including a contribution from Peter Gill the father of DNA analysis the book emphasizes the interpretation of test results and provides the necessary formulae in an easily accessible manner This latest edition is fully updated and includes current and emerging techniques in this fast moving field The book begins by reviewing all pertinent biology and then provides information on every aspect of DNA analysis This includes modern interpretation methods and contemporary population genetic models available for estimating DNA frequencies or likelihood ratios

Following a chapter on procedures for validating databases the text presents overviews and performance assessments of both modern sampling uncertainty methods and current paternity testing techniques including new guidelines on paternity testing in alignment with the International Society for Forensic Genetics Later chapters discuss the latest methods for mixture analysis LCN ultra trace analysis and non autosomal mito X and Y DNA analysis The text concludes with an overview of procedures for disaster victim identification and information on DNA intelligence databases Highlights of the second edition include New information about PCR processes heterozygote balance and back and forward stuttering New information on the interpretation of low template DNA drop models and continuous models Additional coverage of lineage marker subpopulation effects mixtures and combinations with autosomal markers This authoritative book provides a link among the biological forensic and interpretative domains of the DNA profiling field It continues to serve as an invaluable resource that allows forensic scientists technicians molecular biologists and attorneys to use forensic DNA evidence to its greatest potential

**Evaluating Scientific Evidence** Erica Beecher-Monas, 2007 This book examines scientific evidence in both civil and criminal contexts

**Fundamentals of Forensic DNA Typing** John M. Butler, 2009-09-30 Fundamentals of Forensic DNA Typing is written with a broad viewpoint It examines the methods of current forensic DNA typing focusing on short tandem repeats STRs It encompasses current forensic DNA analysis methods as well as biology technology and genetic interpretation This book reviews the methods of forensic DNA testing used in the first two decades since early 1980 s and it offers perspectives on future trends in this field including new genetic markers and new technologies Furthermore it explains the process of DNA testing from collection of samples through DNA extraction DNA quantitation DNA amplification and statistical interpretation The book also discusses DNA databases which play an important role in law enforcement investigations In addition there is a discussion about ethical concerns in retaining DNA profiles and the issues involved when people use a database to search for close relatives Students of forensic DNA analysis forensic scientists and members of the law enforcement and legal professions who want to know more about STR typing will find this book invaluable Includes a glossary with over 400 terms for quick reference of unfamiliar terms as well as an acronym guide to decipher the DNA dialect Continues in the style of Forensic DNA Typing 2e with high profile cases addressed in D N A Boxes Data Notes Applications sections throughout Ancillaries include instructor manual Web site with tailored set of 1000 PowerPoint slides including figures links to online training websites and a test bank with key

**Forensic DNA Typing: Principles, Applications and Advancements** Pankaj Shrivastava, Hirak Ranjan Dash, Jose A. Lorente, Jahangir Imam, 2020-12-11 The book explores the fundamental principles advances in forensic techniques and its application on forensic DNA analysis The book is divided into three modules the first module provides the historical prospect of forensic DNA typing and introduces fundamentals of forensic DNA typing methodology and technical advancements application of STRs and DNA databases for forensic DNA profile analysis Module 2 examines the problems and challenges encountered in extracting DNA and

generating DNA profiles It provides information on the methods and the best practices for DNA isolation from forensic biological samples and human remains like ancient DNA DNA typing of skeletal remains and disaster victim identification the importance of DNA typing in human trafficking and various problems associated with capillary electrophoresis Module 3 emphasizes various technologies that are based on SNPs STRs namely Y STR X STR mitochondrial DNA profiling in forensic science Module 4 explores the application of non human forensic DNA typing of domestic animals wildlife forensics plant DNA fingerprinting and microbial forensics The last module discusses new areas and alternative methods in forensic DNA typing including Next Generation Sequencing and its utility in forensic science oral microbes and forensic DNA phenotyping Given its scope the book is a useful resource in the field of DNA fingerprinting for scientists forensic experts and students at the postgraduate level

**An Introduction to Forensic DNA Analysis, Second Edition** Norah Rudin, Keith

Inman, 2001-12-21 Significant advances in DNA analysis techniques have surfaced since the 1997 publication of the bestselling *An Introduction to Forensic DNA Analysis* DNA typing has become increasingly automated and miniaturized Also with the advent of Short Tandem Repeat STR technology even the most minute sample of degraded DNA can yield a profile providing valuable case information However just as the judicial system slowly and reluctantly accepted RFLP and AmpliType PM DQA1 typing it is now scrutinizing the admissibility of STRs Acknowledging STR typing as the current system of choice *An Introduction to Forensic DNA Analysis Second Edition* translates new and established concepts into plain English so that laypeople can gain insight into how DNA analysis works from sample collection to interpretation of results In response to the shift toward more efficient techniques the authors cover the legal admissibility of STR typing expand the chapter on DNA databases and revise the section on automated analysis They also present key decisions and appellate or supreme court rulings that provide precedent at the state and federal levels Discussing forensic DNA issues from both a scientific and a legal perspective the authors of *An Introduction to Forensic DNA Analysis Second Edition* present the material in a manner understandable by professionals in the legal system law enforcement and forensic science They cover general principles in a clear fashion and include a glossary of terms and other useful appendices for easy reference

**A Resource Guide to Law**

**Enforcement, Corrections, and Forensic Technologies**, 2001 This guide provides information to law enforcement corrections and forensic science professionals to assist them in evaluating acquiring and using equipment and technology The main body of the guide presents an overview of the technology of most concern to the law enforcement corrections and forensic science communities It contains 19 chapters arranged in four sections Section I Officer Protection and Crime Prevention contains eight chapters that focus on protective equipment restraint systems firearms less than lethal weapons pursuit management surveillance offender monitoring officer location and concealed weapon and contraband detection Section II Public Safety in Critical Incidents is composed of three chapters that cover explosives detection and remediation chemical and biological defense and transportation infrastructure security Section III Communications and Information

Technology contains five chapters that address communications interoperability biometric identification information sharing and analysis crime mapping and electronic crime cybercrime Section IV Investigative and Forensic Sciences consists of three chapters that focus on crime laboratory assistance forensic technology research and development and investigative sciences Each chapter includes a description of relevant technologies equipment and devices software and related training available to local law enforcement corrections and forensic science professionals and lists the following potential funding sources standards and testing research and development efforts and sources of further information Four appendixes provide supplemental information on the Justice Department s Office of Justice Programs and Office of Community Oriented Policing Services

*Blood, Bugs, and Plants, Revised Edition* Robert Gaensslen, 2019-10-01 Praise for the previous edition Honor Book Science Grades 7-12 category Society of School Librarians International Blood Bugs and Plants Revised Edition explores several core biological areas that have influenced modern forensic science Entomology bugs is a specialty that uses knowledge about insect life cycles to inform death investigations Botany plants is a specialty that looks at plant materials as evidence in cases Occupying the largest part of this eBook the blood section covers the identification of blood and body fluids determining their origin as human or animal DNA typing and blood spatter patterns Blood Bugs and Plants Revised Edition takes a look at an exciting area of forensic science Each chapter in this fascinating eBook provides an overview that briefly introduces readers to basic concepts in forensic science allowing them to understand how this biological science sheds light on issues in legal cases The forensic science specialty of criminalistics is also discussed in this comprehensive resource Chapters include History and Pioneers Scientific Principles DNA and Genetics Forensic Analysis Evaluation and Identification Testing of Blood and Body Fluid Evidence Forensic Analysis DNA Typing Forensic Analysis Bugs and Plants The Future

**Lessons Learned from 9/11** National Institute of Justice (U.S.), 2006 This report contains the Kinship and Data Analysis Panel s lessons learned particularly regarding DNA protocols laboratory techniques and statistical approaches in the DNA identification of WTC victims It is written primarily for the Nation s forensic laboratory directors and other officials who may be responsible for organizing and managing the DNA identification response to a mass fatality incident

**Forensic DNA Typing** John M. Butler, 2005-02-08 Forensic DNA Typing Second Edition is the only book available that specifically covers detailed information on mitochondrial DNA and the Y chromosome It examines the science of current forensic DNA typing methods by focusing on the biology technology and genetic interpretation of short tandem repeat STR markers which encompass the most common forensic DNA analysis methods used today The book covers topics from introductory level right up to cutting edge research High profile cases are addressed throughout the text near the sections dealing with the science or issues behind these cases Ten new chapters have been added to accommodate the explosion of new information since the turn of the century These additional chapters cover statistical genetic analysis of DNA data an emerging field of interest to DNA research Several chapters on statistical analysis of short tandem repeat STR typing data have been contributed by Dr

George Carmody a well respected professor in forensic genetics Specific examples make the concepts of population genetics more understandable This book will be of interest to researchers and practitioners in forensic DNA analysis forensic scientists population geneticists military and private and public forensic laboratories for identifying individuals through remains and students of forensic science The only book available that specifically covers detailed information on mitochondrial DNA and the Y chromosome Chapters cover the topic from introductory level right up to cutting edge research High profile cases are addressed throughout the book near the sections dealing with the science or issues behind these cases NEW TO THIS EDITION D N A Boxes boxed Data Notes Applications sections throughout the book offer higher levels of detail on specific questions     The Common Good Amitai Etzioni,2014-02-11 In this book Amitai Etzioni public intellectual and leading proponent of communitarian values defends the view that no society can flourish without a shared obligation to the common good Rejecting claims made by some liberal thinkers that it is not possible to balance individual rights with uncoerced civic responsibility Etzioni explores a number of key issues which pose important questions for those concerned with promoting the common good in contemporary society Are we morally obliged to do more for our communities beyond treating everyone as endowed with basic rights Should privacy be regarded not merely as a right but also as an obligation And should the right to free speech take priority over the need to protect children from harmful material in the media and on the internet Etzioni asks how we can strike a healthy balance between individual rights and public safety in an age of global terrorism He evaluates various new government devices from wiretaps to viruses which open our lives to public scrutiny Particular attention is given to the issues surrounding government issued DNA tests The book concludes by questioning whether we can still talk of a relationship between the common good and the nation state or whether the online society in which we live will make it increasingly difficult to maintain those communities which are the very homeland of the common good This new book by one of the world s leading social and political thinkers will be important reading for students and scholars of political science social philosophy sociology and public policy as well as for the interested general reader

*Wondergenes* Maxwell J. Mehlman,2003-09-16 *Wondergenes* not only imagines a future world in which genetic enhancement is the norm but asserts that this future has already begun Genetically engineered substances are already in use by athletes in vitro fertilization already provides the primitive means by which parents can select an embryo and the ability to create new forms of genetically engineered human beings is not far off What happens when gene therapy becomes gene enhancement Who will benefit and who might be left behind What are the costs to our values and beliefs and to the future of our society To answer these questions Maxwell J Mehlman provides an overview of the scientific advances that have led to the present state of genetic enhancement and explains how these advances will be used in the future to redefine what we think of as a normal human being He explores the ethical dilemmas already facing researchers and medical practitioners and the dilemmas we will all be expected to face In his forecast of the dangers inherent in this technology he is particularly



concerned with the emergence of a genobility made up of those able to afford increasingly expensive enhancement Wondergenes is a serious accessible introduction to the social and personal implications of genetic engineering Mehlman weighs the social and economic costs of the many proposals to regulate or limit genetic engineering and provides six concrete policy recommendations from professional licensing to a ban on germ line enhancement that propose to make the future of genetic enhancement more equitable and safe **A Companion to Forensic Anthropology** Dennis

Dirkmaat, 2015-04-20 A Companion to Forensic Anthropology presents the most comprehensive assessment of the philosophy goals and practice of forensic anthropology currently available with chapters by renowned international scholars and experts Highlights the latest advances in forensic anthropology research as well as the most effective practices and techniques used by professional forensic anthropologists in the field Illustrates the development of skeletal biological profiles and offers important new evidence on statistical validation of these analytical methods Evaluates the goals and methods of forensic archaeology including the preservation of context at surface scattered remains buried bodies and fatal fire scenes and recovery and identification issues related to large scale mass disaster scenes and mass grave excavation **DNA and**

**Property Crime Scene Investigation** David Makin, 2015-05-20 Traditionally forensic investigation has not been fully utilized in the investigation of property crime This ground breaking book examines the experiences of patrol officers command staff detectives and chiefs as they navigate the expectations of forensic evidence in criminal cases specifically property crimes cases DNA and Property Crime Scene Investigation looks at the current state of forensic technology and using interviews with police officers command staff forensic technicians and prosecutors elucidates who is doing the work of forensic investigation It explores how better training can decrease backlogs in forensic evidence processing and prevent mishandling of crucial evidence Concluding with a police chief's perspective on the approach DNA and Property Crime Scene Investigation provides insight into an emerging and important approach to property crime scene investigation Key Features Provides practical information on implementing forensic investigation for property crimes Examines the current state of forensic technology and points to future trends Includes a police chief's perspective on the forensic approach to investigating property crimes Utilizes interviews with professionals in the field to demonstrate the benefits of the approach

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