APPENDIX A: AUTHOR AND REVIEWER BIOGRAPHIES

Jeffery G. Barnes

Jeffery G. Barnes double majored at Virginia Wesleyan College, earning a bachelor of arts degree in chemistry and philosophy. He completed graduate school at Virginia Polytechnic Institute and State University, receiving a master of science degree in chemistry. He worked for approximately five years with the City of Virginia Beach Police Department as a forensics services technician, where he earned several awards for his outstanding work. He has been with the Federal Bureau of Investigation (FBI) for almost six years and has earned four on-the-spot awards for excellent performance of duties. As a physical scientist forensic examiner with the latent print operations unit of the FBI Laboratory, he teaches and continues to research the history of the fingerprint science.

Author of Chapter 1 – History. Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology

Debbie Benningfield

Debbie Benningfield is retired from the latent print laboratory section of the Houston Police Department, where she served for nearly 31 years. Her assignments included tenprint work, automated fingerprint identification systems manager, and deputy administrator. Currently, she is an instructor for Ron Smith and Associates, Inc. She is a certified latent print examiner. In 2003, she was appointed a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology and in 2004, she was appointed to the International Association for Identification (IAI) Latent Print Certification Board. In January 2006, the Governor of Texas appointed her as the presiding officer over the newly created Texas Forensic Science Commission. In June 2006, Ms. Benningfield was elected president of the Texas Division of the IAI.

Chapters reviewed: 1, History; 9, Examination Process

Herman Bergman

Herman Bergman started his career in 1995 at the tenprint section of the Dutch Criminal Intelligence Service (CRI). He received in-house education and training in fingerprint history, biology, classification, and automated fingerprint identification systems. He moved to the latent fingerprint section in 1999 and received additional training in development techniques, palmprint comparison, methodology, and AFIS processing. He was certified as a latent print examiner at the Crime Control and Investigation Training Institute in the Netherlands. He is a member of the Ridgeology Working Group (the group's purpose is to assess the desirability of adopting a non-numeric system in the Netherlands), and he has participated in developing a curriculum for latent print examiners seeking certification at the Police Academy. He was also a visiting instructor in the certification program at the Crime Control and Investigation Training Institute. He is a member of the International Association for Identification and the Scientific Working Group on Friction Ridge Analysis, Study, and Technology.

Chapters reviewed: 4, Recording Living and Postmortem Friction Ridge Exemplars; 8, The Preservation of Friction Ridge Information; 9, Examination Process

Steve Bleay

Steve Bleay obtained a bachelor of science degree in materials science from the University of Bath in 1988 and remained at the University of Bath carrying out postgraduate research in electron microscopy of composite materials until 1993. He was awarded a doctor of philosophy degree in 1991. He joined the Defence Research Agency (later QinetiQ) in 1993 and spent 10 years developing stealth materials and carrying out research into the production of novel fibre systems. He joined the Home Office Scientific Development Branch in May 2003 and has been working on novel vacuum metal deposition techniques, recovery of fingerprints from arson scenes, development and production of the IRIS workstation, and digital imaging.

Contributing Author of Chapter 7 – Latent Print Development

Patti Blume

Patti Blume has more than 28 years of experience working for the Orange County (California) Sheriff's Department. Currently, she is a senior forensic specialist assigned to the automated fingerprint identification system (AFIS) unit as the system administrator. Previously, she worked in the Sheriff's Identification Bureau and was assigned to special projects while performing crime scene investigations, impression evidence examinations, latent print comparisons, and evidence processing. Her special projects have included being a project coordinator for accreditation by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board, and she is currently coordinating accreditation for her agency's AFIS system. She has been a regular instructor for the California Department of Justice/ California Criminalistics Training Institute, teaching latent print comparisons and latent print techniques. Currently, she is on the editorial board of the *Journal of Forensic Identification* and has participated on the FBI Permanency Project on the persistency of ridge detail. She has an associate of science degree in evidence technology and a bachelor of science degree in public administration, and belongs to various forensic professional organizations.

Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology; 4, Recording Living and Postmortem Friction Ridge Exemplars; 6, Automated Fingerprint Identification Systems (AFIS); 9, Examination Process; 12, Quality Assurance

Donna Brandelli

Donna Brandelli has a bachelor of science degree in criminal justice from California State University and a master of science degree in forensic science from National University. She is completing her doctor of philosophy degree in human behavior with a focus on criminal justice through Capella University. She is a recipient of the William C. Battles Achievement Award in Criminal Justice and past president of the local division of the Alpha Phi Sigma Criminal Justice Honor Society. She is a member of the American Academy of Forensic Sciences, the Academy of Criminal Justice Sciences, and the International Association

for Identification, and is on the editorial board of the *Journal of Forensic Identification.* She has testified as an expert witness in the areas of fingerprint comparison, chemical processing, and crime scene investigation. She created and presented a training class on crime scene preservation geared to first responders, which has been presented to municipal, county, and federal agencies across the country. She is a research partner with the FBI regarding the permanence of friction ridge skin. As an adjunct faculty member, she has taught Introduction to Forensic Science, Introduction to Criminology, and Introduction to Policing and Contemporary Issues in Law Enforcement at the University of Phoenix and American InterContinental University.

Chapter reviewed: 13, Fingerprints and the Law

Mary Ann Brandon

Criminalist Mary Ann Brandon, certified latent print examiner, has been involved in friction ridge science with the Portland (Oregon) Police Bureau for more than 29 years. With two other examiners, she researched and published *"Cloned" Primates and the Possibility of Identical Fingerprints.* Sponsored by the Portland Police Bureau and the International Association for Identification, she initiated the TwinPrint Study in 2000. She taught Forensic Science and Criminal Investigation at Portland Community College for eight years and recently obtained her certification as a medicolegal death investigator in Oregon. She has served on the Scientific Working Group on Friction Ridge Analysis, Study, and Technology for 10 years.

Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology

Thomas Busey

Thomas Busey received his bachelor of arts degree from Cornell University in 1988 and his doctor of philosophy degree in cognitive psychology from the University of Washington in 1994. He has been on the faculty at Indiana University in the Department of Psychological and Brain Sciences since 1994. He is currently funded by the National Institute of Justice to identify the nature of

human expertise in latent print examiners with the goal of improving the understanding of the quantitative analyses of fingerprints.

Coauthor of Chapter 15 – Special Abilities and Vulnerabilities in Forensic Expertise

Leonard G. Butt

Leonard G. Butt is currently employed with the Maryland State Police, Forensic Sciences Division as a forensic scientist. Previously, he worked as a fingerprint specialist for the Drug Enforcement Administration. He is retired from the Baltimore County, Maryland Police Department. His assignments there included crime scene technician, latent print examiner, identification unit supervisor, and interim crime laboratory director. He served on the Printrak AFIS Users' Group Executive Committee and represented the International Association for Identification in the Federal Bureau of Investigation's IAFIS Working Group. Mr. Butt is a certified latent print examiner and a graduate of the FBI National Academy. He is the current chairman of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology.

Chapters reviewed: 9, Examination Process; 10, Documentation of Friction Ridge Impressions: From the Scene to the Conclusion; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Mike Campbell

Captain of Police Mike Campbell (retired) is a 28 year veteran of the City of Milwaukee Police Department, and served as the commanding officer of its identification division. Upon retirement, he took a position as a training coordinator with Ron Smith and Associates, Inc., a forensic training and consulting company based in Collinsville, Mississippi. He had more than 20 years of experience as a crime scene and fingerprint identification specialist with the department. He was responsible for the day-to-day operation of the crime scene response unit; all evidence photography and digital imaging systems; and the procurement and operation of the department-wide booking, AFIS, and criminal history systems. He has taught more than 250

courses and lectured numerous times on these matters to several thousand students in 25 states and Canada during the last 15 years. He is a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology and serves on the International Association of Chiefs of Police Forensic Committee and on the Board of Directors for the International Association for Identification (IAI). Mr. Campbell is a past president of the Wisconsin Law Enforcement Executive Development Association and the Wisconsin Division of the IAI. He also holds active memberships in the Canadian Identification Society and the Midwest Association of Forensic Scientists.

Chapters reviewed: 1, History; 4, Recording Living and Postmortem Friction Ridge Exemplars; 5, Systems of Friction Ridge Classification; 9, Examination Process

Antonio A. Cantu

Antonio Cantu's interests include the chemistry of documents and the chemistry of fingerprints. He received his doctor of philosophy degree in chemical physics from the University of Texas in Austin, Texas. He began his government career in 1972 with what is now the National Institute of Justice. A year later he joined the Bureau of Alcohol, Tobacco, and Firearms. He then joined the Federal Bureau of Investigation in 1983. In 1985, Dr. Cantu joined the U.S. Secret Service and devoted his first eight years to the area of technical security. For the next three years, he developed scientific methods for determining the source of counterfeit currency. After that, he was with the Forensic Services Division, becoming the Chief Scientist. He retired from the U.S. Secret Service in April 2007. He has published many articles, mostly regarding ink analysis and latent print chemical development. In 1980, he received the Forensic Scientist of the Year Award from the Mid-Atlantic Association of Forensic Scientists and in 2002, he received the highly coveted Paul L. Kirk Award from the American Academy of Forensic Sciences.

Contributing Author of Chapter 7 – Latent Print Development

Christophe Champod

Christophe Champod received his master of science degree and doctor of philosophy degree (summa cum laude) in forensic science from the University of Lausanne in 1990 and 1995, respectively. He remained in academia until holding the position of assistant professor in forensic science. From 1999 to 2003, he led the Interpretation Research Group of the Forensic Science Service (United Kingdom), before taking a professorship position at the School of Criminal Sciences (ESC)/Institute of Forensic Science (IPS) of the University of Lausanne. Mr. Champod co-authored the book *Fingerprints and Other Ridge Skin Impressions* (CRC Press, 2004). He is in charge of education and research on identification methods (detection and identification). He is a member of the International Association for Identification and of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology. His research is devoted to the statistical evaluation of forensic identification techniques. The value of fingerprint evidence is at the core of his interests.

Chapters reviewed: 1, History; 6, Automated Fingerprint Identification Systems (AFIS); 7, Latent Print Development; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Sue Manci Coppejans

Sue Manci Coppejans has worked in the forensic science field with the Alabama Department of Forensic Sciences since June 1992. She is a certified latent fingerprint examiner. She has a bachelor of science degree from the University of South Alabama. She served on the International Association for Identification Latent Fingerprint Certification Board from 1999 to 2003. She has served as a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology for the past four years. She has taught numerous classes and given presentations on the topic of fingerprints at international and local meetings.

Chapters reviewed: 4, Recording Living and Postmortem Friction Ridge Exemplars; 7, Latent Print Development

Christine L. Craig

Christine Craig is a crime scene analyst and a footwear and tire track examiner at the Seminole County Sheriff's Office in Sanford, Florida. She is a member of the International Association for Identification and is a certified footwear examiner and certified crime scene analyst. She is also a regional team leader for the fingerprinting section of the Florida Emergency Mortuary Operations Response System.

Ms. Craig has a master of science degree in biology from Virginia Commonwealth University and is currently obtaining a doctor of philosophy degree in ecology at the University of Florida.

Chapters reviewed: 1, History; 7, Latent Print Development

Brent T. Cutro, Sr.

Brent Cutro, currently employed by the Illinois State Police Forensic Sciences Command, began his career in forensic sciences in 1981 after receiving a bachelor of science degree in biology from George Williams College. He has held various positions relating to the science of latent print examination. Some of these positions include latent print section quality assurance coordinator, latent print section advisory committee member, research advisory committee member, and section supervisor. Additionally, he served on Illinois' first AFIS committee in its inaugural year. He is a member of the International Association for Identification and the Midwestern Association of Forensic Scientists, and is a Fellow of the Fingerprint Society. He has been involved with various research projects, most notably including one entitled "A Water Soluble Non-Carcinogenic Fluorescent Pigment as an Alternative to Rhodamine 6G," which was presented at the FBI International Forensic Symposium on Latent Prints held in Quantico, Virginia. In addition to his duties as a latent print examiner for the Illinois State Police, Mr. Cutro has taught many latent print courses, workshops, and classes. He continues to lecture for several colleges and universities and is currently an instructor with North East Multi-Regional Training, Inc., an Illinois law enforcement training organization.

Author of Chapter 4 – Recording Living and Postmortem Friction Ridge Exemplars. Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology; 9, Examination Process; 10, Documentation of Friction Ridge Impressions: From the Scene to the Conclusion

Itiel E. Dror

Dr. Itiel Dror has expertise and a proven track record in conducting scientific research as well as in improving human performance in applied expert domains. He has a Ph.D. from Harvard University in Psychology and Cognitive Science, and he has published over 75 scientific articles. Dr.

Dror has provided training workshops and consultancy to medical doctors, surgeons, frontline police, military fighter pilots, financial executives, forensic examiners, and experts in other domains, all aimed at enhancing decisionmaking and performance. Dr. Dror has worked with a variety of governmental bodies (such as the U.S. Air Force, the U.K. Army and MoD, the U.K. Passport and Identity Services, and Police Forces in the United States, United Kingdom, the Netherlands and Israel). His work focuses on perception, judgement, and decisionmaking, and how expertise, training, and technology can improve performance at the workplace. Dr. Dror divides his time between academia, at University College London (UCL), and applied research and consultancy, at Cognitive Consultants International (CCI). More information is available at: www.cci-hq.com.

Coauthor of Chapter 15 – Special Abilities and Vulnerabilities in Forensic Expertise

Jeri Eaton

Jeri Eaton worked for the King County Sheriff's Department for 20 years and was the supervisor of the latent fingerprint unit. Prior to King County, she worked for the Iowa Division of Criminal Investigation as a latent examiner, crime scene investigator, and forensic photographer. She chairs the Pacific Northwest Region Latent Print Certification Board and is a member of the International Association for Identification (IAI) Crime Scene Certification Board as well as a member of the IAI AFIS Committee. For the past seven years, she has been a member of the Scientific Working Group for Friction Ridge Analysis, Study, and Technology. Ms. Eaton is a past president of the Pacific Northwest Division of the International Association for Identification. She is a certified latent print examiner and certified senior crime scene analyst. She has made presentations and published articles for the IAI and recently conducted a worldwide study on the uniqueness of latent fingerprints for which publication is pending.

Chapter reviewed: 6, Automated Fingerprint Identification Systems (AFIS); 8, The Preservation of Friction Ridge Information

Wayne Eaton

Wayne Eaton is the forensic operations manager for the King County Sheriff's Office Regional AFIS System. Prior to

King County, he managed automated fingerprint identification system (AFIS) and livescan implementation projects for several state and local law enforcement agencies, including integration with other criminal justice systems. He worked with international standards organizations and international focus groups to facilitate AFIS interoperability. Mr. Eaton was manager of systems engineering for 10 years for Sagem Morpho, an AFIS vendor. Before that he worked as a forensic scientist for the Iowa Division of Criminal Investigation Crime Laboratory. He holds a bachelor of science degree in chemistry from Central University of Iowa and a master of business administration degree from City University.

Chapter reviewed: 6, Automated Fingerprint Identification Systems (AFIS)

Michael K. French

Michael K. French is a certified latent print examiner with 13 years of experience in law enforcement and private consultation. He has extensive experience in the development, imaging, examination, and electronic searching of fingerprint evidence, as well as expertise in writing laboratory development, hygiene, and safety guidelines. As a consultant, he specializes in reviewing lab procedures, auditing fingerprint-related casework, and training students in forensic evidence techniques. He worked for the King County Sheriff's Office from 1994 to 2006, where he was a lead examiner during the Green River Homicide Investigation. He has a bachelor of arts degree in public safety from Central Washington University.

Coauthor of Chapter 7 – Latent Print Development

Deborah Friedman

Deborah Friedman holds a master of science degree in forensic chemistry and a masters in business administration. She has more than 25 years of working experience in a crime laboratory. This experience encompasses the forensic science disciplines of trace evidence, biology, latent prints, controlled substances, and crime scene investigations. During the last seven years, she has been employed as the quality manager for the Broward Sheriff's Office Regional Crime Laboratory. Deborah Friedman is one of the founding members and current president of the Association of Forensic Quality Assurance Managers.

Chapters reviewed: 1, History; 12, Quality Assurance; 14,Fingerprints and the Law

Robert J. Garrett

Robert J. Garrett spent more than 30 years in law enforcement. He attended Rutgers University and is a graduate of the New Jersey State Police Academy. Before retiring, he was the supervisor of the crime scene unit of the Middlesex County Prosecutor's Office in New Jersey. Mr. Garrett has authored many articles relating to crime scene subjects and has testified as an expert on a variety of forensic disciplines. He has been a lecturer at state, regional, and international conferences and serves on the editorial board of the *Journal of Forensic Identification.* He served on the Board of Directors of the International Association for Identification and is currently its second vice president, and chairs the association's professional review board. He is certified by the IAI as a senior crime scene analyst and latent print examiner. He is a Fellow of the Fingerprint Society of Great Britain.

Chapters reviewed: 4, Recording Living and Postmortem Friction Ridge Exemplars; 6, Automated Fingerprint Identification Systems (AFIS); 7, Latent Print Development; 8, The Preservation of Friction Ridge Information; 9, Examination Process; 10, Documentation of Friction Ridge Impressions: From the Scene to the Conclusion; 11, Equipment; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

M. Leanne Gray

M. Leanne Gray earned her bachelor of science degree at Northeast Missouri State University. She is a forensic scientist in the United States specializing in latent fingerprint and footwear examination at a state crime laboratory system. She has worked thousands of cases during the past 20 years and has acted as a quality assurance coordinator for both the latent fingerprint and footwear sections. In addition, she has been a training coordinator and was responsible for developing and implementing a comprehensive training program in the area of latent fingerprint examination. She also provides training and consultation via her private business, Gray's Forensic Fingerprint Training & Consultation, which is based in Oregon, Wisconsin. She is a certified latent print examiner.

Author of Chapter 12 – Quality Assurance. Chapter reviewed: 9, Examination Process

Lynne D. Herold

Lynne Herold received her bachelor of science degree from Kent State University in 1974 and her doctor of philosophy degree in biology sciences from the University of Southern California in 1984. She taught Histology at the University of Southern California while completing her doctorate degree and has worked as an adjunct faculty member for the Union Institute and University. She began her career in criminalistics in 1984 with the Los Angeles County Coroner's office. In 1989, she transferred to the Los Angeles Sheriff's Department Scientific Services Bureau, where she is currently employed as a senior criminalist. Her biological studies and specific interest in the microscopic identification of botanical and animal tissues and their structure has been instrumental in providing a foundation for her testimony in many cases in the United States and internationally. She has presented papers and made poster presentations at numerous symposiums and professional seminars conducted by the Federal Bureau of Investigation, the California Association of Criminalists, and the American Academy of Forensic Sciences.

Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology

Peter T. Higgins

Peter T. Higgins earned a master of science degree in mathematics and computer science from Stevens Institute of Technology in Hoboken, New Jersey. He began his professional career as a mathematician with the U.S. Central Intelligence Agency. He served in various capacities at that agency, to include establishing the Chief Information Technology office and managing research in biometrics. He then joined the Federal Bureau of Investigation in 1992, where he was responsible for the development of the integrated automatic fingerprint identification system (IAFIS). He became the deputy assistant director and was in charge of engineering in the FBI Criminal Justice Information Services Division. He retired from the FBI in 1995 and has been involved with fingerprint agencies in several countries, providing consulting services. He chaired the IAI AFIS committee for five years. He has published

in biometrics and AFIS technology. He has lectured at the university level on AFIS and biometric technology.

Contributing Author of Chapter 6 – Automated Fingerprint Identification Systems (AFIS)

Laura A. Hutchins

Laura A. Hutchins has over nine years of experience as a latent fingerprint examiner and is currently employed at the United States Secret Service. Ms. Hutchins received her training at the Federal Bureau of Investigation's (FBI) Laboratory Latent Print Unit. In addition to her FBI latent print certification, she is certified by the International Association for Identification (IAI). Ms. Hutchins is extremely active in the field of friction ridge identification. She has been a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST) since 2005 and is a current board member of and Web editor for the IAI. Additionally, she is a technical reviewer for the *Journal of Forensic Identification* and is the editor for the Chesapeake Bay Division of the IAI. Ms. Hutchins is a member of an Intra-agency working group established by the National Science and Technology Council. Additionally, she has experience business process mapping crime laboratories in order to streamline and implement process improvement. Ms. Hutchins received a Bachelor of Arts degree in anthropology from Marquette University and a Master of Science degree in biological anthropology from the University of Wisconsin.

Author of Chapters: 5, Systems of Friction Ridge Classification; 8, The Preservation of Friction Ridge Information. Chapters reviewed: 1, History; 4, Recording Living and Postmortem Friction Ridge Exemplars; 6, Automated Fingerprint Identification Systems (AFIS); 9, Examination Process

Charles P. Illsley

Charles P. Illsley is a certified latent print examiner with 30 years of experience in various types of forensics examinations. He has testified as an expert witness in laser and forensic light technology, fingerprint identification, and clandestine drug lab manufacture in California, Idaho, Utah, and New York. He retired after 25 years of service with two Utah police departments. Now Mr. Illsley is a part-time forensic consultant for the Utah Attorney General's Office

and also consults with various law enforcement agencies on cold case forensics examinations. Mr. Illsley is a life active member of the International Association for Identification. He served on the International Association of Identification Board of Directors and as president in 1998. He is a published author and lectures throughout the United States and Canada on various forensic and expert witness issues. He currently serves on the editorial board of the *Journal of Forensic Identification.* He is also a past president of the Utah Division of the IAI and now serves as chairperson for the Utah Latent Print Certification Committee. Mr. Illsley was a member of SWGFAST from 1996 to 2005 and wrote the cooperative grant proposal that funded the publication and distribution of this sourcebook.

Author of Sourcebook cooperative grant proposal.

Vici Kay Inlow

Vici Kay Inlow is the identification branch chief for the United States Secret Service, Washington, D.C. Prior to working with the Secret Service, she was the senior forensic specialist with the Orange County Sheriff Coroner in Santa Ana, California. She has been involved in the various aspects of forensic identification, crime scene investigation, and research for more than 30 years. Ms. Inlow has taught crime scene investigation, latent impression processing techniques, and friction ridge comparison at various colleges and professional conferences.

Contributing Author of Chapter 7 – Latent Print Development

Ginger A. Kobliska

Ginger A. Kobliska holds a master of science degree in forensic science and is a latent print and footwear examiner for the Indiana State Police at the Indianapolis Regional Laboratory. She is an active member of the American Academy of Forensic Sciences, the International Association for Identification, and the Midwestern Association of Forensic Scientists. She has been a board member of the Indiana Division of the International Association of Identification for several years and has served as its secretary treasurer. In addition, she organizes forensic team building exercises and is a contractor for Ron Smith and Associates, Inc.

Chapter reviewed: 1, History

Peter D. Komarinski

Peter D. Komarinski is a biometric consultant with more than 20 years of experience with automated fingerprint identification systems (AFIS). He is retired from the New York State Division of Criminal Justice Services where he was an AFIS manager. His responsibilities included testing system enhancements and the particular application of latent print identification to AFIS. He is the author of *Automated Fingerprint Identification Systems* (Elsevier Press) and is chair of the IAI AFIS Committee. He has written, lectured, and testified as an expert regarding AFIS.

Chapter reviewed: 6, Automated Fingerprint Identification Systems (AFIS)

Glenn Langenburg

Glenn Langenburg is currently employed by the Minnesota Bureau of Criminal Apprehension as a certified latent print examiner and crime scene investigator. He earned a bachelor of science degree in forensic science from Michigan State University in 1993 and a master of science degree in analytical chemistry in 1999 from the University of Minnesota. He is a doctor of philosophy candidate in the forensic science program at the University of Lausanne, Switzerland. His thesis research centers on the application of the ACE V methodology for fingerprint comparisons. Mr. Langenburg is an adjunct faculty member at Metropolitan State University in St. Paul, Minnesota. He teaches an introductory forensic science course. He has lectured nationally and internationally at forensic science conferences in the United States, Canada, and Europe on topics including Daubert issues, research, and fingerprint methodology. He also teaches several fingerprint comparison workshops. He has the privilege of serving the fingerprint community as a member of the Scientific Working Group for Friction Ridge Analysis, Study, and Technology.

Author of Chapter 14 – Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Deborah Leben

Deborah Leben has been employed with the U.S. Secret Service (USSS) as a fingerprint specialist for 17 years. During this time, she has conducted research, along with other laboratory scientists, relating to the development of latent

prints. Other duties include managing information technology projects within the Department of Homeland Security and the USSS. She has a master of science degree in forensic science, a master of science degree in technology management, is a project management professional through the Project Management Institute, and is a certified latent print examiner. She is currently president of the Chesapeake Bay Division of the International Association for Identification (IAI), a member of the editorial board of the *Journal of Forensic Identification,* and a member of the board of directors for the IAI.

Chapter reviewed: 7, Latent Print Development

William F. Leo

William Leo has been a fingerprint examiner for 35 years, and is the lead instructor in the Los Angeles Sheriff Department's Latent Print Examiner Training Program. He has a Bachelor of Science degree in Criminal Justice and a Master of Science degree in Criminology from Indiana State University. He has lectured extensively and has provided expert witness testimony on the scientific and legal foundation of friction ridge identification. He has served as an Adjunct Professor of Administration of Justice at three Southern California Colleges. He has authored numerous papers and the textbook, *Fingerprint Identification.* He is a Past-President of the Southern California Association of Fingerprint Officers.

Chapters reviewed: 1, History; 13, Fingerprints and the Law

Bridget Lewis

Bridget Lewis received an associate of arts degree from the Des Moines Area Community College. She started her career in law enforcement in 1979 as a police cadet with the City of Des Moines, Iowa Police Department. In 1985, she transferred to the identification section and became responsible for the investigation of crime scenes. Since 1996, she has been employed at the Iowa Division of Criminal Investigation as a criminalist in the identification section of the criminalistics laboratory. There she conducts analyses and comparisons on fingerprint, footwear, and tire impression evidence. Ms. Lewis is a certified latent print examiner. She is currently on the board of directors for the International Association for Identification and is also a member of the Scientific Working Group for Friction Ridge Analysis, Study, and Technology.

Chapters reviewed: 1, History; 4, Recording Living and Postmortem Friction Ridge Exemplars; 7, Latent Print Development; 11, Equipment

Alice Maceo

Alice Maceo is currently the forensic laboratory manager for the latent print detail of the Las Vegas Metropolitan Police Department. She has worked in the latent print discipline since 1997 and achieved latent print certification by the International Association for Identification (IAI) in 2001. She is an active speaker at forensic conferences in the United States, Canada, and Europe. She has published articles in the *Journal of Forensic Identification and Fingerprint Whorld.* Since 2001, she has had the honor of participating in the Scientific Working Group on Friction Ridge Analysis, Study, and Technology. In 2004, she earned distinguished member status with the IAI. She has a bachelor of science degree in biology from the University of Alaska.

Author of Chapters: 2 – Anatomy and Physiology of Adult Friction Ridge Skin; 10 – Documentation of Friction Ridge Impressions: From the Scene to the Conclusion. Chapters reviewed: 8, The Preservation of Friction Ridge Information; 9, Examination Process; 12, Quality Assurance

James L. May III

James L. May III has been working in law enforcement since 1993. During his career he has focused on a variety of forensic disciplines, most notably crime scene investigations and infant death investigations. In January 2004, he was recruited by the Centers for Disease Control to assist in co-authoring the book *Sudden, Unexplained Infant Death Investigation.* Mr. May currently works for Tooele City Police Department as a Detective/Forensic Investigator. Over the length of his career, Mr. May has been an instructor for numerous agencies nationwide. He also serves on the editorial board of the *Journal of Forensic Identification.*

Chapter reviewed: 13, Fingerprints and the Law

R. Michael McCabe

R. Michael McCabe retired as a computer scientist from NIST and is currently a senior consultant for Identification Technology Partners. He is a graduate of John Carroll University and American University. Having worked closely

with the FBI on fingerprint and other AFIS related projects, he was responsible for the development of the ANSI/NIST-ITL 2007 fingerprint standard in addition to several ANSI and ISO fingerprint standards.

Contributing Author of Chapter 6 – Automated Fingerprint Identification Systems (AFIS)

Stephen B. Meagher

Fingerprint Specialist Stephen B. Meagher is a 35-year veteran of the Federal Bureau of Investigation (FBI) and has been actively involved in the forensic latent print discipline for 29 years. He has conducted forensic examinations in hundreds of criminal cases and has testified as an expert throughout the United States and in Canada. He has held several management positions, including FBI chief for a latent print unit. He is currently managing a program related to legal aspects of the latent print discipline as well as coordinating and conducting research regarding latent print identification. Mr. Meagher planned, coordinated, and led a team of experts in response to the first legal Daubert challenge to the fingerprint science. He has since testified in 19 Daubert hearings in federal and state courts. He has been an instructor or lecturer on every aspect of the forensic latent print discipline to fingerprint experts, the general scientific community, researchers, attorneys, judges, developers, and manufacturers of fingerprint related technology. He has been actively involved in establishing fingerprint standards through the efforts of the National Institute of Standards and Technology. He is a member of the International Association for Identification Board of Directors; vice chair of the Scientific Working Group for Friction Ridge Analysis, Study, and Technology; and vice chair of the Interpol Fingerprint Monitoring Expert Group.

Coauthor of Chapter 13 Fingerprints and the Law

Andre A. Moenssens

Andre A. Moenssens is a forensic consultant and retired professor with emeritus status from two universities. He began his training in fingerprints in Belgium in 1950. He earned a Juris Doctor degree with honors in 1966 and a

Master of Laws degree from Northwestern University in 1967. He has qualified as an expert in state and federal courts, and has consulted widely in the U.S. and abroad. Author of several texts on fingerprinting and on scientific evidence, he is also an Editor-in-Chief of the Wiley Encyclopedia of Forensic Science's print version and online update service. He is a member of the International Association for Identification, a Distinguished Fellow of the American Academy of Forensic Science, and member of other professional societies.

Coauthor of Chapter 13 – Fingerprints and the Law. Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Kenneth Moses

Kenneth Moses has over 40 years of experience in the forensic sciences. A graduate of the University of California at Berkeley, Mr. Moses established the Crime Scene Investigations Unit of the San Francisco Police Department in 1983 and was instrumental in promoting automated fingerprint systems throughout the United States. He served as a member of SWGFAST and as chairman of the AFIS Committee for the IAI, where he vigorously encouraged live scan and digital palmprint technologies.

Author of Chapter 6 – Automated Fingerprint Identification Systems (AFIS)

Julieanne Perez Avila

Julieanne Perez Avila is currently employed at the Wisconsin State Crime Laboratory in Milwaukee as a forensic scientist/latent print examiner. She earned her Bachelor of Arts degree in criminal justice from the University of Wisconsin in 1990 and a Master of Science degree in forensic science from the University of New Haven in 1992. She is a member of the American Academy of Forensic Science, the Midwestern Association of Forensic Scientists, the International Association for Identification, and the Wisconsin Association for Identification.

Author of Chapter 11 – Equipment

Michael Perkins

Michael Perkins is a Crime Scene Analyst Supervisor with the Las Vegas Metropolitan Police Department. He is a distinguished member of the International Association for Identification; serves on the editorial board of the *Journal of Forensic Identification;* and is certified as a latent print examiner, senior crime scene analyst, bloodstain pattern examiner, and forensic photographer.

Chapters reviewed: 5, Systems of Friction Ridge Classification; 10, Documentation of Friction Ridge Impressions: From the Scene to the Conclusion; 11, Equipment; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Salil Prabhakar

Salil Prabhakar is a leading expert in biometrics and large scale identity systems. He is the chief scientist and director of R&D at DigitalPersona Inc., California. He recently designed the biometric system for the Unique Identification Authority of India as a volunteer. Salil is a co-author of more than 40 technical publications and holds two patents. He co-authored the *Handbook of Fingerprint Recognition* (Springer 2003, 2009), which received the Professional/Scholarly Publishing Division award from the Association of American Publishers. He has co-chaired several Institute of Electrical and Electronics Engineers (IEEE), International Association of Pattern Recognition, and SPIE conferences; has been associate editor for four international journals including IEEE *Transactions on Pattern Analysis and Machine Intelligence;* and is a senior member of IEEE and VP Finance for IEEE Biometrics Council. He received his B. Tech. degree from the Institute of Technology, Banaras Hindu University, Varanasi, India in 1996 and his Ph.D. degree from Michigan State University in 2001, both in Computer Science and Engineering.

Contributing Author of Chapter 6 – Automated Fingerprint Identification Systems (AFIS)

Robert Ramotowski

Robert Ramotowski is employed as a research chemist with the United States Secret Service Forensic Services Division. He has been employed with the U.S. Secret Service in this capacity since 1994. His position involves coordinating research activities within the division in the areas of fingerprint visualization, document examination, ink chemistry, and optical and chemical tagging and tracking technologies. He received a bachelor of science degree in chemistry in 1993 and a master of science degree in chemistry in 1997 from George Washington University.

Contributing Author of Chapter 7 – Latent Print Development

Charles Richardson

Charles "Chuck" Richardson has been employed in the science of fingerprints since 1963. He was a senior fingerprint specialist with the FBI for 18 years, a fingerprint specialist with the United States Secret Service for 10 years, and a senior fingerprint specialist and program manager with the Drug Enforcement Administration for 11 years. He is a certified latent print examiner. Mr. Richardson has been an instructor in all phases of the science of fingerprints at both the FBI and the Department of Justice Academies. He has assisted in the training of FBI and Drug Enforcement Agency (DEA) fingerprint specialists; DEA forensic chemists; and FBI, DEA, and United States Air Force, Office of Special Investigations, special agents. He has also assisted in the training of Assistant United States Attorneys at the Department of Justice's Judge Advocate General's School. In addition, he has conducted 40 hour courses for local police agencies in advanced latent fingerprints and courtroom testimony throughout the country. He currently serves as an instructor for IAI-sponsored training classes. Mr. Richardson is a former member of the Board of Directors of the IAI and a former member of the IAI's Latent Print Certification Board. He has testified in excess of 100 times in federal, state, and military courts in 30 states and Puerto Rico. He is currently a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology.

Chapters reviewed: 1, History; 5, Systems of Friction Ridge Classification; 9, Examination Process

Vaughn Sears

In 1981, Vaughn Sears obtained a bachelor of science degree in biochemistry from the University of Sussex. In June 1981, he joined the United Kingdom's Home Office to work in the Fingerprint Development Group. Since then he has carried out research and development on almost all of the

Home Office-recommended fingerprint development processes. He was responsible for the HFE-based ninhydrin and DFO formulations and the blood enhancement dyes acid black 1, acid violet 17, and acid yellow 7. He also carried out many studies of the image capture of fingerprints, including equipment and capture media. He has published more than a dozen scientific papers on fingerprint topics and is the publication manager for both *The Home Office Manual of Fingerprint Development Techniques and The Fingerprint Development Handbook.* He is a member of the Royal Society of Chemistry and in 2005, the Royal Photographic Society awarded him the position of an Accredited Imaging Scientist and Associate of the Society.

Contributing Author of Chapter 7 – Latent Print Development

Kenneth O. Smith, Jr.

Kenneth O. Smith, Jr., has been a latent print analyst since 1965. He retired in 2006 as the assistant laboratory director of the United States Postal Inspection Service. He is currently a self-employed forensic latent print examiner. His past credentials include: member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology; International Association for Identification (IAI) Board of Directors; IAI Representative for Latent Print Proficiency Testing; Chair and Secretary of the IAI Latent Print Certification Board; Virginia Scientific Advisory Committee; and the International Review Committee of the FBI Madrid Bombing case.

Chapters reviewed: 8, The Preservation of Friction Ridge Information; 12, Quality Assurance

Michelle L. Snyder

Michelle L. Snyder is employed as a forensic scientist at the Ohio Bureau of Criminal Identification and Investigation. She has a Bachelor of Science degree in Pre-Medical Biology and a Bachelor of Arts degree in Sociology from Indiana University of Pennsylvania, as well as a Master of Science Degree in Forensic Science from Marshall University. Ms. Snyder serves as the forensic science coordinator

for the latent print section to ensure section compliance with ASCLD-LAB accreditation guidelines. She is a member of the International Association for Identification (IAI) and the Chesapeake Bay Division of the IAI.

Chapters reviewed: 1, History; 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology; 4, Recording Living and Postmortem Friction Ridge Exemplars

Lisa J. Steele

Lisa J. Steele practices law in Bolton, Massachusetts. She is a graduate of Mount Holyoke College and Western New England College School of Law. Ms. Steele has been representing indigent defendants in criminal appeals in Massachusetts and Connecticut since 1995. She was the author of the amicus brief (for the NACDL, Massachusetts Association of Criminal Defense Lawyers, and The Committee for Public Counsel Services) in *Commonwealth* v *Patterson,* a Massachusetts Supreme Court case regarding fingerprint evidence. She is the author of several law review articles about criminal law and science, including *The Defense Challenge to Fingerprints,* 40:3 Crim. L. Bultn. 213 (2004).

Chapter reviewed: 14, Fingerprints and the Law

Jon T. Stimac

Jon T. Stimac has supplemented early research on the solvent HFE-7100 and introduced to the forensic community the use of Un-du as an alternative adhesive separator. For the development of latent print impressions on thermal and carbonless papers, he introduced a specialized ninhydrin formulation and the use of 1,2-indanedione. He has published several technical articles covering these and other topics in international forensic identification journals. Mr. Stimac is a member of SWGFAST and is also active in several regional and international forensic identification organizations.

Chapters reviewed: 7, Latent Print Development; 9, Examination Process; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

B. Scott Swann

B. Scott Swann is with the Federal Bureau of Investigation's (FBI) Criminal Justice Information Services (CJIS) Division. During his 15 year tenure, he has served as an engineer to ensure the integrity of FBI IAFIS repositories, supported multiple technology refreshment implementations, and served as the Unit Chief responsible for directing, coordinating, and administering related biometrics technologies and services. Currently, Mr. Swann is the Science and Technology Lead for Identity Intelligence as part of a joint duty assignment with the Office of the Director of National Intelligence. Mr. Swann is a certified project management professional through the Project Management Institute and holds a master of science degree in software engineering from West Virginia University.

Contributing Author of Chapter 6 – Automated Fingerprint Identification Systems

Lyla A. Thompson

Lyla A. Thompson is the Section Supervisor in the latent print section of the Johnson County, Kansas Criminalistics Laboratory. She has more than 35 years of experience as a latent print examiner employed in Johnson County, Kansas, and with the Independence, Missouri Police Department. She is a member of the Scientific Working Group on Friction Ridge Analysis, Study and Technology. She is a certified latent print examiner currently serving as chair of the International Association for Identification Latent Print Certification Board.

Chapters reviewed: 4, Recording Living and Postmortem Friction Ridge Exemplars; 5, Systems of Friction Ridge Classification; 12, Quality Assurance

Michele Triplett

Michele Triplett is a certified latent print examiner with the King County Sheriff's Office in Seattle, Washington. She holds a bachelor of science degree in mathematics and statistics from Washington State University and has been employed in the friction ridge identification discipline for more than 13 years. She currently serves on the editorial board of the *Journal of Forensic Identification* and is a member of the International Association for Identification General Forensics Subcommittee.

Chapter reviewed:14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

John R. Vanderkolk

John R. Vanderkolk, Indiana State Police, has a B.A. in Forensic Studies and Psychology from Indiana University and is the manager of the Indiana State Police Fort Wayne Regional Laboratory. He is a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology; the Expert Working Group on Human Factors in Latent Print Analysis; and the editorial board for the *Journal of Forensic Identification.* He is a distinguished member of the International Association for Identification and serves as the chair for its Forensic Identification Standards committee. Mr. Vanderkolk consulted with the Office of the Inspector General in reference to the erroneous fingerprint identification in the Brandon Mayfield case. He also authored the textbook *Forensic Comparative Science – Qualitative Quantitative Source Determination of Unique Impressions, Images, and Objects* (Elsevier/Academic Press 2009).

Author of Chapter 9 – Examination Process. Chapters reviewed: 1, History; 2, Anatomy and Physiology of Adult Friction Ridge Skin; 3, Embryology, Physiology, and Morphology; 14, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Melissa Wakefield

Melissa Wakefield holds a bachelor of applied science (forensic investigation) from the Canberra Institute of Technology and has studied chemistry with the Australian National University. During these studies, she undertook an independent and ongoing research project to investigate a novel method for developing latent fingerprints on thermal paper. Ms. Wakefield is currently completing a research honours program with the University of Canberra's National Centre for Forensic Studies, with the support of

the Australian Federal Police, while teaching fingerprint development techniques and forensic analytical chemistry for CIT's Centre for Forensic Science.

Contributing Author of Chapter 7 – Latent Print Development

James L. Wayman

James L. Wayman received a Ph.D. in engineering in 1980 from the University of California, Santa Barbara. He joined San Jose State University in 1995 to direct the Biometric Identification Research Program, serving as director of the U.S. National Biometric Test Center at San Jose State from 1997 to 2000. He is co-editor of *Biometric Systems* (Springer, London, 2005). He is a Fellow of the British Institution of Engineering and Technology; a Principal UK Expert to ISO/IEC JTC1 SC37 standards committee on biometrics; editor of ISO/IEC 19794-13, "Voice Data Format"; and former editor of ISO/IEC 19794-3, "Finger Pattern Spectral Data Format". He was a member of the U.S. National Academies of Science committees "Whither Biometrics", "Authentication Technologies and Their Implications for Privacy", and "Panel on Information Technology". Mr. Wayman has served as a paid biometrics advisor to nine national governments.

Chapter reviewed: 15, Scientific Research in the Forensic Discipline of Friction Ridge Individualization

Michael J. Wenger

Michael J. Wenger has a doctor of philosophy degree in experimental psychology from Binghamton University and postdoctoral training from Indiana University in mathematical psychology. Mr. Wenger's research focuses on the dynamic interactions of perceptual and memory processes, facial perception and memory, perceptual and cognitive expertise, and latency accuracy relations in perception and cognition. Central to each of these research endeavors is a commitment to developing and testing formal (mathematical and computational) models of the hypotheses and phenomena under consideration, with an emphasis on the tools of computational neuroscience.

Chapter reviewed: Visual Expertise and Latent Print Examinations [Replaced in this volume with Chapter 15 – Special Abilities and Vulnerabilities in Forensic Expertise]

Kasey Wertheim

Kasey Wertheim established his forensic career as a Forensic Scientist for the Mississippi Crime Laboratory, and launched his technical career with a small forensic technology company, LumenIQ, as their director of forensic services. In 2004, he established the Department of Defense Biometric Examination Services Team and formed his own consulting company, and has worked on fingerprint- and technology-related problems for federal clients. Mr. Wertheim has lectured, conducted workshops, published papers, and participated in research projects in the latent print discipline. He earned Distinguished Member status with the International Association for Identification (IAI), served as the chair of the Latent Print Subcommittee of the IAI for two years, was a certified crime scene analyst for five years, serves on the editorial board of the *Journal of Forensic Identification,* and is a certified latent print examiner.

Author of Chapter 3 – Embryology, Physiology, and Morphology. Chapters reviewed: 2, Anatomy and Physiology of Adult Friction Ridge Skin; 6, Automated Fingerprint Identification Systems (AFIS); 8, The Preservation of Friction Ridge Information; 9, Examination Process

Juliet H. Wood

Juliet H. Wood is the Automated Fingerprint Identification System Program Manager at the U.S. Army Criminal Investigation Laboratory and a certified latent print examiner. She served as editor of the Georgia State Division of the International Association for Identification from 2002 to 2006 and is currently on the editorial board of the *Journal of Forensic Identification*. She has a Master of Forensic Science from George Washington University and a Bachelor of Science in Engineering from Columbia University.

Chapters reviewed: 1, History; 4, Recording Living and Postmortem Friction Ridge Exemplars; 7, Latent Print Development; 8, The Preservation of Friction Ridge Information; 11, Equipment; 12, Quality Assurance

Brian Yamashita

Brian Yamashita received a Bachelor of Science (honors) degree in Chemistry from the University of Manitoba and a Ph.D. in Physical Chemistry from the University of Western Ontario in London, Ontario. He joined the Royal Canadian Mounted Police (RCMP) in 1989, where he currently does research and development work in forensic science with an emphasis on forensic identification. He is on the editorial boards of the *Journal of Forensic Identification* and the *RCMP Gazette,* and is the editor of the *Canadian Society of Forensic Science Journal*. He is a member of both SWGSTAIN and SWGTREAD.

Coauthor of Chapter 7 – Latent Print Development

Rodolfo R. Zamora

Mr. Zamora works with the Chandler Police Department, an Internationally Accredited Lab (ISO). He has over 30 years experience doing crime scene work, evidence processing, latent print analysis, and restoring mummified friction skin. He has been involved in teaching around the state of Arizona in these same areas. He is a past president of the Arizona Identification Council (IAI), and past member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology. He has testified in juvenile, superior, federal, and Iraqi Courts.

Chapters reviewed: 4, Recording Living and Postmortem Friction Ridge Exemplars; 7, Latent Print Development; 9, Examination Process
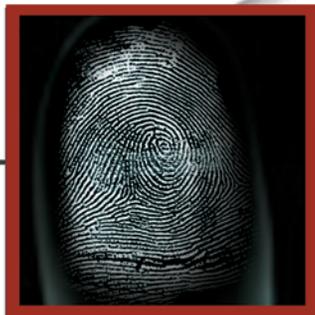
APPENDIX B: THE ORIGIN OF THE SCIENTIFIC WORKING GROUP ON FRICTION RIDGE ANALYSIS, STUDY AND TECHNOLOGY (SWGFAST)

With the development of the field of DNA analysis, the Federal Bureau of Investigation (FBI) implemented a technical working group to develop best-practice guidelines for the community. Having witnessed the success of the program, in 1992 they explored the concept of promoting the development of additional Technical Working Groups (TWGs) in support of other forensic disciplines. Three members of the latent print community were introduced to this initiative when they attended a meeting with Kenneth Nimmich at the FBI Academy in Quantico, Virginia. They heard about the program that provided for a structured means to develop consensus standards to preserve and improve the quality of service within the DNA discipline. Following this informal presentation, they were asked whether there would be any value in establishing a similar working group to address the latent print discipline. Stephen Meagher from the FBI Laboratory, Curtis Shane of the Naval Investigative Services, and Leonard Butt with the Baltimore County, Maryland, Police Department were all in agreement that they would support such a program. The meeting ended, and time passed.

On June 10, 1995, a group of 15 distinguished individuals came together at the first meeting of what became known as the Technical Working Group on the Forensic Aspects of Friction Ridge Analysis. The following people represented this founding body: David Ashbaugh (Royal Canadian Mounted Police); Margaret Black (Orange County Sheriff's Office, California); Diane Bowman (Oakland Police Department, California); Robin Bratton (Michigan State Police); James Johnson (United States Secret Service); John Nielson (Wisconsin Department of Justice); Curtis Shane (Naval Investigative Services); James Springs (South Carolina Law Enforcement Division); and, from the FBI, Danny Greathouse, John Massey, Stephen Meagher, Eugene Mulholland, Kenneth Nimmich, James Ridgely, and Claude Sparks.

The discussions that took place over the next 11 days served to lay the foundation for what this technical working group would attempt to accomplish. Amazingly, the thought was that this would be a short-term project. Expectations were that it would terminate upon the completion of the issuance of a set of guidelines to satisfy their self-imposed goal.

From the minutes of that first meeting:

> The basic proposed purpose of the group is:
>
> Create guidelines for latent print practitioner knowledge, analytical methodology, and ability to perform friction ridge examinations. To establish and promulgate methods for research and validation of innovative techniques. That the guidelines be recognized by forensic administrators and the judicial arena as the standard for acceptable practices of friction ridge examinations.

By definition, technical working groups are formed to address specific tasks. When the tasks are completed, the group is disbanded. The FBI determined that the established TWGs were to become long-term functioning bodies and they were reestablished as scientific working groups. To reflect this, the name Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) was officially adopted in 1998.

Over the years, the primary topics that have been the subject of consideration by the group have not changed very much. These include minimum qualifications and training, certification, proficiency testing, quality assurance, integrity, advancement of the technology, and adoption of guidelines. When appropriate, as events have occurred over the years that had the potential to impact the practicing community at large, attempts have been made to address them individually. There has never been a want of topics to be considered by SWGFAST.

As the role of SWGFAST evolved, its objectives became more refined and are more accurately reflected by the following:

• To establish standards and guidelines for the development and enhancement of friction ridge examiners' knowledge, skills, and abilities.

• To discuss and share friction ridge examination methods and protocols.

• To encourage and evaluate research and innovative technology related to friction ridge examination.

• To establish and disseminate standards and guidelines for quality assurance and quality control.

• To cooperate with other national and international organizations in developing standards.

• To disseminate SWGFAST studies, standards, guidelines, and findings.

SWGFAST's policy is to publish all guidelines and standards for comment from the community prior to being accepted as final documents. By design, this process is meant to ensure that the final work actually represents and satisfies the needs of practitioners as well as the science community and provides a vision that extends beyond that of just the SWGFAST membership.

After being discussed a minimum of three times over the years, in 2007 the decision was made to expand the role of SWGFAST beyond that of the latent print discipline. This was accomplished through the establishment of a standing committee of representatives from the tenprint community. Although it was recognized that each discipline has its own specific responsibilities, the underlying principles and interest are the same. Furthermore, tasks performed by latent print examiners are dependent on the services performed within the tenprint community. Experiences gained as a result of this expansion have revealed that the true differences between the disciplines are really quite minimal.

Evolution in the SWGFAST program is further demonstrated by the diversity represented among its members. SWGFAST has up to 40 Parent Body members and up to 10 members on the Tenprint Committee. Initially, the membership represented managers and practitioners from the latent print community. As consideration was given to new members, it was recognized that there would be significant value in providing a broader representation of backgrounds and interests. Currently, members come from diversified backgrounds and include latent print examiners, tenprint examiners, defense experts, researchers, academics, and managers. This group's diversity provides an objective, yet varied, perspective on all matters of interest to the group. The demographics represented by such a group serve to assure the inclusion of many justified, yet oftentimes opposing, perspectives that are to be discussed during the normal deliberations. This equates to a process that is better able to serve the community by injecting an internal measure of balance and objectivity when considering work on a particular task.

SWGFAST maintains a continued commitment to the overall needs of the friction ridge science community. As part of that commitment, the group makes recommendations that extend beyond the practicing community in order to support the discipline. A primary example of that can be found in this *Fingerprint Sourcebook.*

As with the SWGFAST documents, there will be a continuing need to update the materials contained in the *Fingerprint Sourcebook.* Provisions for such updating bring additional merit to the work as being a living document conceptualized to provide ongoing and current support for the profession.

Lenny Butt, Chairman
Scientific Working Group on Friction Ridge Analysis, Study and Technology
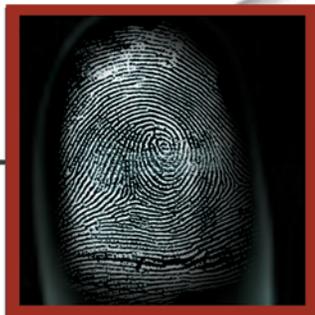
APPENDIX C: MEMBERS OF SWGFAST

PARENT BODY

NAME	AGENCY	DATES
ARMSTONG, Benjamin	Plano Police, Texas	1996 to 1998
ASHBAUGH, David	Royal Canadian Mounted Police	1995; 2001 to 2005
BELL, Jackie	Federal Bureau of Investigation	1997 to 2002
BENNINGFIELD, Debbie	Houston Police, Texas	2004 to present
BERGMAN, Herman	Oakland Police, California	2006 to present
BLACK John	Private Examiner	2007 to present
BLACK, Maggie	Orange County Sheriff, California	1995 to present
BLUME, Patti	Orange County Sheriff, California	1996
BOWMAN, Diane	Oakland Police, California	1995
BRANDON, Mary	Portland Police, Oregon	1996 to 2007
BRATTON, Robin	Michigan State Police	1995 to 2002
BUTT, Lenny	Maryland State Police	2002 to present
CAMPBELL, Mike	Milwaukee Police, Wisconsin	2003 to 2007
CARTER, Danny	Texas Dept. of Public Safety	1996 to 1998
CHAMPOD, Christophe	University of Lausanne, Switzerland	2005 to present
CLARK, John	Western Identification Network	1999 to present
COPPEJANS, Mary Sue	Alabama Department of Science	2003 to 2008
CURRIE, Ian	Royal Canadian Mounted Police	2007 to 2011

| NAME	AGENCY	DATES
EATON, Geraldine	King County Sheriff, Washington	1998 to 2009
FISCHER, Deborah	Florida Dept. of Law Enforcement	1999 to 2002
FITZPATRICK, Frank	Orange County Sheriff, California	1997 to present
FUTRELL, Ivan	Federal Bureau of Investigation	1996
GARRETT, Robert	Private Examiner	2008 to present
GERMAN, Edward	United States Army Crime Lab	1996 to present
GETTEMY, James	Florida Dept. of Law Enforcement	1998 to 2008
GISHE, Melissa	Federal Bureau of Investigation	2007 to present
GREATHOUSE, Danny	Federal Bureau of Investigation	1995
GRIEVE, David	Illinois State Police	1996 to 2008
GRIMM, Michael	Virginia Div. Forensic Science	1998 to 2005
HANKERSON, Larry	Alcohol, Tobacco, Firearms, GA	1999 to 2004
HASTY, Danny	Washington County Sheriff, FL	1996 to 2008
HECKER, Scott	Federal Bureau of Investigation	2008 to present
HICKLIN, Austin	NOBLIS	2009 to present
HOLLARS, Mitch	Federal Bureau of Investigation	2003 to present
HUTCHINS, Laura	United States Secret Service	2006 to present
ILLSLEY, Charles	West Valley Police, Utah	1996 to 2005
INLOW, Vici	United States Secret Service	1998 to 2006
JOHNSON, James	United States Secret Service	1995 to 2007
KILGORE, John	Iowa Crime Lab	1996 to 1997
LANGENBURG, Glenn	MN Bureau of Criminal Invest.	2004 to present
LEWIS, Bridget	Iowa Crime Lab	2002 to present
MACEO, Alice	Las Vegas Metro Police, Nevada	2001 to present
MARTIN, Kenneth	Massachusetts State Police	2000 to 2002
MASSEY, John	Federal Bureau of Investigation	1995 to 1999
MASTERS, Nancy	California Department of Justice	1996
MCFARLANE, Walter	Alaska Crime Lab	1996 to 2001
MCROBERTS, Alan	Private Examiner	1996 to present
MEAGHER, Steven	Federal Bureau of Investigation	1995 to 2007
MICHAUD, Gregoire	Michigan State Police	2006 to 2009
MOENSSENS, Andre	University of Missouri	2005 to present
MOSES, Ken	San Francisco Police, California	1996 to 1997
MULHOLLAND, Eugene	Federal Bureau of Investigation	1995
NEUMANN, Cedric	Pennsylvania State University	2008 to present

NAME	AGENCY	DATES
NEUNER, John	North Carolina State Crime Lab	1995
NIELSON, John	Wisconsin Department of Justice	1995 to 1996
NIMMICH, Ken	Federal Bureau of Investigation	1995 to 1996
PARKER, Charles	Corpus Christi Police, Texas	1996 to 2002
PASE, Barbara	Federal Bureau of Investigation	1996 to 2002
REES, Alison	Alcohol, Tobacco, Firearms, MD	2008 to present
RICHARDSON, Charles	Drug Enforcement Agency, VA	1996 to present
RIDGELY, JAMES	Federal Bureau of Investigation	1995
ROBERTS, Maria Antonia	Federal Bureau of Investigation	2008 to present
ROONEY, Larry	Suffolk County Police, New York	1996 to 1997
SAUNDERS, John	Federal Bureau of Investigation	1996
SCHENCK, Rodney	United States Army Crime Lab	2008 to present
SCHWARZ, Matt	Private Examiner	2011 to present
SHANE, Curtis	Federal LE Training Center, GA	1995 to 1996
SIBERT, Robert	Federal Bureau of Investigation	2000 to 2001
SIMONS, Allyson	Federal Bureau of Investigation	1996 to 2000
SOLTIS, Greg	Federal Bureau of Investigation	2004 to present
SPADAFORA, Anthony	Wisconsin Department of Justice	11996 to 2000
SPARKS, Claude	Federal Bureau of Investigation	1995
SPECKELS, Carl	Phoenix Police, Arizona	2008 to present
SPRINGS, James	South Carolina Law Enforcement	1995 to 1997
STIMAC, Jon	Oregon State Police	2000 to present
STONEY, David	Private Examiner	2011 to present
THOMPSON, Lyla	Johnson County Sheriff, Kansas	1998 to present
TRIPLETT, Michele	King County Sheriff, Washington	2007 to present
TROZZI, Tim	Federal Bureau of Investigation	1996 to 1999
VANDERKOLK, John	Indiana State Police	1996 to present
WALLACE, James	Las Vegas Metro Police, Nevada	2007 to 2009
WEIR, Maria	Los Angeles Sheriff's Department, CA	2010 to present
WERTHEIM, Kasey	Mississippi Crime Laboratory	2003 to present
WERTHEIM, Pat	United States Army Crime Lab	1996 to present
WIENERS, Mike	Federal Bureau of Investigation	1996 to 2004
WILLIS, Bill	FL Department of Public Safety	1996 to 2005
ZABINSKI, Mark	Rhode Island State Crime Lab	2000 to 2009
ZAMORA, Rodolfo	Mesa Police, Arizona	1999 to 2008
ZERCIE, Kenneth	Connecticut State Police	1996 to 2005

STANDING TENPRINT COMMITTEE

NAME	AGENCY	DATES
BLUE, Kenneth	TN Bureau of Investigation	2008 to 2011
BOURQUE, Camille	Los Angeles Police Dept., CA	2008 to present
BURKE, Kevin	Andover Police Department, MA	2008 to present
COTTON, David	FBI - CJIS Division	2008 to present
CRAIG, Jamie	DHS Fingerprint Center, CA	2011 to present
GORDEN, Michael	FBI - CJIS Division	2008 to present
MAYNARD, Mona Lisa	Ohio Bureau of Crim. Ident.	2008 to 2009
MEANS, Joseph	SC Law Enforcement	2008 to present
MILLER, Judith	TX Dept. of Public Safety	2008 to present
SMITH, Charles	FBI - CJIS Division	2010 to present
WHITNEY, Candy	FBI - CJIS Division	2008 to 2010
YADA, Kimberly	Portland Police, OR	2008 to present
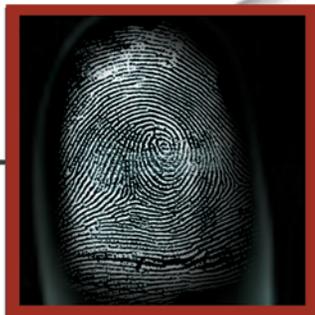
APPENDIX D: SWGFAST STANDARD TERMINOLOGY OF FRICTION RIDGE EXAMINATION, VER. 3.0

Preamble This document provides standard definitions for relevant terminology used in the friction ridge discipline. Common definitions found in other reference sources may not be included.

ACE-V. The acronym for a scientific method; Analysis, Comparison, Evaluation, and Verification (see individual terms).

AFIS. The acronym for Automated Fingerprint Identification System, a generic term for a fingerprint matching, storage, and retrieval system.

Analysis. The first step of the ACE-V method. The assessment of an impression to determine suitability for comparison.

APIS. The acronym for Automated Palmprint Identification System, a generic term for a palmprint (or complete friction ridge exemplar) matching, storage, and retrieval system.

Arch – plain. A pattern type in which the friction ridges enter on one side of the impression and flow, or tend to flow, out the other side with a rise or wave in the center.

Arch - tented. A pattern type that possesses either an angle, an upthrust, or two of the three basic characteristics of the loop.

Artifact. 1. Any distortion or alteration not in the original friction ridge impression, produced by an external agent or action.

2. Any information not present in the original object or image, inadvertently introduced by image capture, processing, compressions, transmission, display, or printing.

Bias. See cognitive bias, confirmation bias, and contextual bias.

Bifurcation. The point at which one friction ridge divides into two friction ridges.

Blind verification. The independent examination of one or more friction ridge impressions at any stage of the ACE process by another competent examiner who is provided with no, or limited, contextual information, and has no expectation or knowledge of the determinations or conclusions of the original examiner.

Bridge. A connecting friction ridge between, and generally at right angles to, parallel running friction ridges.

Characteristics. Distinctive details of the friction ridges, including Level 1, 2, and 3 details (also known as features).

Cognitive bias. The effect of perceptual or mental processes on the reliability and validity of one's observations and conclusions.

Comparison. The second step of the ACE-V method. The observation of two or more impressions to determine the existence of discrepancies, dissimilarities, or similarities.

Competency. Possessing and demonstrating the requisite knowledge, skills, and abilities to successfully perform a specific task.

Complete friction ridge exemplars. A systematic recording of all friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, joints, tips, and sides of the fingers (also known as major case prints).

Complex examinations. The encountering of uncommon circumstances during an examination (e.g., the existence of high distortion, low quality or quantity, the possibility of simultaneity, or conflicts among examiners).

Conclusion. Determination made during the evaluation stage of ACE-V, including individualization, inconclusive, exclusion.

Confirmation bias. The tendency to search for data or interpret information in a manner that supports one's preconceptions.

Conflict. A difference of determinations or conclusions that becomes apparent during, or at the end of, an examination.

Consultation. A significant interaction between examiners regarding one or more impressions in question.

Contextual bias. The effect of information or outside influences on the evaluation and interpretation of data.

Core. 1. The approximate center of a fingerprint pattern.

2. A specific formation within a fingerprint pattern, defined by classification systems such as Henry.

Delta. The point on a friction ridge at or nearest to the point of divergence of two type lines, and located at or directly in front of the point of divergence. Also known as a tri-radius.

Deviation. 1. A change in friction ridge path.

2. An alteration or departure from a documented policy or standard procedure.

Discrepancy. The presence of friction ridge detail in one impression that does not exist in the corresponding area of another impression (compare with dissimilarity).

Dissimilarity. A difference in appearance between two friction ridge impressions (compare with discrepancy).

Dissociated ridges. 1. Disrupted, rather than continuous, friction ridges.

2. An area of friction ridge units that did not form into friction ridges, generally due to a genetic abnormality.

Distortion. Variances in the reproduction of friction skin caused by factors such as pressure, movement, force, and contact surface.

Dot. An isolated friction ridge unit whose length approximates its width in size.

Edgeoscopy. 1. Study of the morphological characteristics of friction ridges.

2. Contour or shape of the edges of friction ridges.

Elimination prints. Exemplars of friction ridge skin detail of persons known to have had legitimate access to an object or location.

Enclosure. A single friction ridge that bifurcates and rejoins after a short course and continues as a single friction ridge.

Ending ridge. A single friction ridge that terminates within the friction ridge structure.

Erroneous exclusion. The incorrect determination that two areas of friction ridge impressions did not originate from the same source.

Erroneous individualization. The incorrect determination that two areas of friction ridge impressions originated from the same source.

Evaluation. The third step of the ACE-V method wherein an examiner assesses the value of the details observed during the analysis and the comparison steps and reaches a conclusion.

Exclusion. The determination by an examiner that there is sufficient quality and quantity of detail in disagreement to conclude that two areas of friction ridge impressions did not originate from the same source.

Exemplars. The prints of an individual, associated with a known or claimed identity, and deliberately recorded electronically, by ink, or by another medium (also known as known prints).

Features. Distinctive details of the friction ridges, including Level 1, 2, and 3 details (also known as characteristics).

Fingerprint. An impression of the friction ridges of all or any part of the finger.

Focal points. 1. In classification, the core(s) and the delta(s) of a fingerprint.

2. Another term for target group.

Friction ridge. A raised portion of the epidermis on the palmar or plantar skin, consisting of one or more connected ridge units.

Friction ridge detail (morphology). An area comprised of the combination of ridge flow, ridge characteristics, and ridge structure.

Friction ridge examiner. A person who analyzes, compares, evaluates, and verifies friction ridge impressions.

Friction ridge unit. A single section of ridge containing one pore.

Furrows. Valleys or depressions between friction ridges.

Galton details. Term referring to friction ridge characteristics (also known as minutiae) attributed to the research of English fingerprint pioneer, Sir Francis Galton.

Henry Classification. An alpha-numeric system of fingerprint classification named after Sir Edward Richard Henry used for filing, searching, and retrieving tenprint records.

IAFIS. The acronym for Integrated Automated Fingerprint Identification System, the FBI's national AFIS.

Identification. 1. See individualization.

2. In some forensic disciplines, this term denotes the similarity of class characteristics.

Impression. Friction ridge detail deposited on a surface.

Incipient ridge. A friction ridge not fully developed that may appear shorter and thinner than fully developed friction ridges.

Inconclusive. The determination by an examiner that there is neither sufficient agreement to individualize, nor sufficient disagreement to exclude.

Individualization. The determination by an examiner that there is sufficient quality and quantity of detail in agreement to conclude that two friction ridge impressions originated from the same source.

Joint (of the finger). The hinged area that separates segments of the finger.
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Known prints (finger, palm, foot). The prints of an individual, associated with a known or claimed identity, and deliberately recorded electronically, by ink, or by another medium (also known as exemplars).

Latent print. 1. Transferred impression of friction ridge detail not readily visible.

2. Generic term used for unintentionally deposited friction ridge detail.

Level 1 detail. Friction ridge flow, pattern type, and general morphological information.

Level 2 detail. Individual friction ridge paths and associated events, including minutiae.

Level 3 detail. Friction ridge dimensional attributes, such as width, edge shapes, and pores.

Lift. An adhesive or other medium used to transfer a friction ridge impression from a substrate.

Loop. A pattern type in which one or more friction ridges enter upon one side, recurve, touch or pass an imaginary line between delta and core and flow out, or tend to flow out, on the same side the friction ridges entered. Types include left slant loops, in which the pattern flows to the left in the impression; right slant loops, in which the pattern flows to the right in the impression; radial loops, in which the pattern flows in the direction of the radius bone of the forearm (toward the thumb); and ulnar loops, in which the pattern flows in the direction of the ulna bone of the forearm (toward the little finger).

Major case print. A systematic recording of the friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, joints, tips, and sides of the fingers (also known as complete friction ridge exemplars).

Mark. Term commonly used in the United Kingdom and some Commonwealth countries to designate a latent print.

Matrix. The substance that is deposited or removed by the friction ridge skin when making an impression.

Minutiae. Events along a ridge path, including bifurcations, ending ridges, and dots (also known as Galton details).

Missed individualization. The failure to make an individualization when in fact both friction ridge impressions are from the same source.

NGI. The acronym for Next Generation Identification, the updated version of IAFIS.

Original image. Primary image; with respect to digital images, an accurate replica (bit-for-bit value) of the primary image.

Palmprint. An impression of the friction ridges of all or any part of the palmar surface of the hand.

Pattern classification. Sub-division of pattern type, defined by classification systems such as Henry or National Crime Information Center (NCIC) classifications.

Pattern type. Fundamental pattern of the ridge flow: arch, loop, whorl. Arches are subdivided into plain and tented arches; loops are subdivided into radial and ulnar loops; whorls are subdivided into plain whorls, double loops, pocket loops, and accidental whorls.

Phalanx/Phalange. 1. A bone of the finger or toe.

2. Sometimes used to refer to a segment of a finger.

Poroscopy. A study of the size, shape, and arrangement of pores.

Primary image. The first recording of an image onto media.

Proficiency. The ongoing demonstration of competency.

Quality. The clarity of information contained within a friction ridge impression.

Quantity. The amount of information contained within a friction ridge impression.

Ridge flow. 1. The direction of one or more friction ridges.

2. A component of Level 1 detail.

Ridge path. 1. The course of a single friction ridge.

2. A component of Level 2 detail.

Ridge unit. See friction ridge unit.

Segment (of the finger). The proximal, medial, or distal section of the finger.

Short ridge. A single friction ridge beginning, traveling a short distance, and then ending.

Simultaneous impression. Two or more friction ridge impressions from the same hand or foot deposited concurrently.

Source. An area of friction ridge skin from an individual from which an impression originated.

Spur. A bifurcation with one short friction ridge branching off a longer friction ridge.

Stand-alone. A segment of a simultaneous impression that has sufficient information to arrive at a conclusion of individualization independent of other impressions within the aggregate.

Substrate. The surface upon which a friction ridge impression is deposited.

Sufficiency. The product of the quality and quantity of the objective data under observation (e.g., friction ridge, crease, and scar features).

Sufficient. The determination that there is sufficiency in a comparison to reach a conclusion at the evaluation stage.

Suitable. The determination that there is sufficiency in an impression to be of value for further analysis or comparison.

Target group. A distinctive group of ridge features (and their relationships) that can be recognized.

Technical review. Review of notes, documents, and other data that forms the basis for a scientific conclusion (see ASCLDLAB 2008 Manual).

Tenprint. 1. A generic reference to examinations performed on intentionally recorded friction ridge impressions.

2. A controlled recording of an individual's available fingers using ink, electronic imaging, or other medium.

Tolerance. The amount of variation in appearance of friction ridge features to be allowed during a comparison, should a corresponding print be made available.

Trifurcation. The point at which one friction ridge divides into three friction ridges.

Type lines. The two innermost friction ridges associated with a delta that parallel, diverge, and surround or tend to surround the pattern area.

Verification. The independent application of the ACE process as utilized by a subsequent examiner to either support or refute the conclusions of the original examiner; this may be conducted as blind verification. Verification may be followed by some level of review as specified by agency policy.

Whorl - accidental. 1. A pattern type consisting of the combination of two different types of patterns (excluding the plain arch) with two or more deltas.

2. A pattern type that possesses some of the requirements for two or more different types of patterns.

3. A pattern type that conforms to none of the definitions of a pattern.

Whorl - central pocket loop. A pattern type that has two deltas and at least one friction ridge that makes, or tends to make, one complete circuit, which may be spiral, oval, circular, or any variant of a circle. An imaginary line drawn between the two deltas must not touch or cross any recurving friction ridges within the inner pattern area.

Whorl - double loop. A pattern type that consists of two separate loop formations with two separate and distinct sets of shoulders and two deltas.

Whorl - plain. A fingerprint pattern type that consists of one or more friction ridges that make, or tends to make, a complete circuit, with two deltas, between which, when an imaginary line is drawn, at least one recurving friction ridge within the inner pattern area is cut or touched.

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