Scientific Protocols for FORENSIC EXAMINATION OF CLOTHING

Jane Moira Taupin
Chesterene Cwiklik

A Volume in the
Protocols in Forensic Science Series

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Protocols in Forensic Science Series

Keith Inman and Norah Rudin, Series Editors

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by Jane Moira Taupin and Chesterene Cwiklik

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Preface

This text will describe and discuss the forensic examination of clothing, primarily clothing exhibits in criminal and civil cases. Clothing and other textiles are part of everyday life; so it is not surprising that when a crime or other incident takes place, clothing items are present and often directly involved. Items of clothing are thus one of the most common types of exhibit examined. Clothing can provide valuable information in cases of violent crimes, such as homicide or rape, and in burglary, robbery, arson, vehicular accidents, and other crimes and infractions. Clothing items often contain crucial evidence. Moreover, examination of clothing from a crime may elicit its "story," much like examining a crime scene helps to reconstruct the crime. In some cases, the garment itself may be considered a crime scene.

No comprehensive text on forensic examination of clothing exists. The subject has traditionally been presented as a chapter in general forensic texts or been discussed as a source of samples when describing specialized forensic techniques. This text focuses on the clothing itself, including damage to the clothing and information from stains and deposits encountered on it.

Because clothing submitted as potential evidence has most often been worn on the body, special features must be considered. The garment may have traveled from one scene to another, may not have been stationary during the commission of the crime, or may even have been worn by someone else prior to, or subsequent to, the crime or other incident under investigation. There may be damage associated with deposits and deposits associated with particular actions and body movements.

We believe that the subject of clothing examination deserves a comprehensive treatment. As DNA testing technology becomes increasingly specific to individuals, and as increasingly smaller amounts of DNA can be coaxed to yield results, the sampling of evidence draws our attention. By examining damage and deposits and evaluating what actions may have produced them, the examiner can ensure that the samples collected for testing have the potential to address the questions in a case. This defines the potential for a significant test result, giving the examiner a tool to control for error and to make defensible testing decisions that can withstand scrutiny. Preliminary examinations and interpretations form the basis for subsequent testing. Rigorous sampling decisions ensure that subsequent testing is relevant and useful. In addition, the information obtained from clothing examination may provide answers about the circumstances of a case. We hope this book provides the examiner with some tools for these tasks.

Every criminalist or forensic scientist who analyzes samples from clothing items should know how to examine clothing to discover the relevant evidence and understand how that evidence relates to crucial legal questions. Other personnel who collect evidence from clothing items, including forensic pathologists or police evidence technicians, should approach the task with similar understanding. We will describe crucial factors to consider when analyzing a clothing item.

Some forensic laboratories assign cases to forensic scientists or caseworkers with a particular specialty, because the evidence of initial interest is in that field. For example,

a biologist may receive clothing from a rape case, or a firearms examiner clothing from a shooting. That caseworker is then responsible for recognizing and preserving all potentially relevant evidence, not only the evidence in that specialty. Other laboratories designate a generalist to perform a complete clothing examination that includes sample collection, or technicians may collect samples from clothing and submit them to the particular forensic specialists. In addition, the police, other investigators, or evidence technicians may submit samples from clothing to a specialist. We hope that all examiners of clothing will find the text useful and thought provoking.

Forensic scientists are not expected to be experts in any or all specialized forensic techniques. Forensic specialties, such as DNA profiling or fire scene reconstruction, may require considerable study and qualification before one can be considered an expert. Unless qualified in more than one specialty, a forensic biologist who is given a T-shirt as evidence from a shooting would not be expected to analyze gunshot residue obtained from that T-shirt, and in some laboratories would not be expected to perform DNA profiling on blood from it. However, he or she *should* be expected to *recognize* the presence of gunshot residue and make the necessary accommodations for its analysis. The initial examiner should also be able to integrate the results of subsequent testing with the data from the initial clothing examination without exceeding the bounds of his or her own expertise.

The work of the Innocence Project at Cardozo Law School in New York, through its use of DNA technology, has led to the courts overturning or dismissing the convictions of more than 200 prisoners, many of whom were on death row (Scheck et al., 2000; Innocence Project, 2008). Some of these convictions were attributed to incomplete or erroneous interpretation of forensic evidence, including clothing items. In this imperfect world, it is the concern of many a good scientist that he or she may have overlooked evidence that may be significant or may have misinterpreted a test result. This has stimulated our work on a systematic, data-based approach that acknowledges the importance of and confers rigor on non-numerical observations.

We are pleased that this text is part of the Protocols in Forensic Science Series, edited by Keith Inman and Norah Rudin. Their flagship book, *Principles and Practice of Criminalistics* (Inman and Rudin, 2001), eloquently expressed the basic principles of forensic examination. A good scientific protocol encompasses an approach to examination that is grounded in sound scientific practice and encompasses the scientific basis, advantages, and limitations of each technique or step in the process. We hope that this text will help the examiner who is trying to decide how to approach a clothing examination, that it will be a resource for the examiner who would like more information on a specific topic, and that it will be a useful reference for the laboratory quality assurance officer.

It is not necessary to read and digest the whole book to gain information as to why clothing is examined and what information can be obtained in the context of a particular crime. Thus, an attorney or investigator may gain information that may help the questioning of an expert witness or may assist in deciphering a forensic report or statement by referring to the relevant forensic discipline and/or chapters as outlined in the table of contents or index. We hope the text will be useful to the police detective, investigator, attorney, archaeologist, or curator who needs to understand the types of information that can be obtained from clothing examination.

In closing, this book provides a comprehensive, integrated, interdisciplinary approach to the examination of clothing that can be used as a ready reference when examining a clothing exhibit.

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And finally, she thanks Peter Barnett for the idea that led to this book.

Chesterene Cwiklik extends her appreciation first to Mary Jarrett-Jackson, formerly the supervisor of the serology and trace evidence unit of the Detroit Police Department Crime Laboratory, who taught her how to look at a case and how to perform a clothing examination. She thanks George Ishii, who as the laboratory director of the Washington State Patrol Crime Laboratory in Seattle provided a clear focus on the crime laboratory, serving a criminal justice system, including police, prosecution, and defense. She thanks Kay Sweeney, head of the criminalistics section and later director of the same laboratory for fostering a multidisciplinary approach to casework and ensuring the cross-training of scientists in disciplines outside their own. Mr. Sweeney is now with KMS Forensics, Inc., and continues to be a valued colleague. Mrs. Jarrett-Jackson, Mr. Ishii, and Mr. Sweeney, through their insights and questions, fostered a spirit of inquiry, and by their management decisions, encouraged thorough casework and supported research. She is grateful to Dr. Walter C. McCrone for encouraging her interest in microscopy, and thanks Wheeling College chemistry professors Chester A. Giza, PhD, and Charles J. Loner, PhD, for insisting on rigorous scientific thinking.

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About the Authors

Jane Moira Taupin obtained a bachelor of science (honors) degree from the University of Melbourne in Australia. Upon graduating, she accepted research positions at University of Melbourne research facilities, first in antibody production at the Howard Florey Institute and in cancer research at the Austin Hospital. She joined the Australian Federal Police as a constable and then stage 1 detective and worked in diverse areas, including drug surveillance and government fraud. During this time, she was transferred temporarily to work at the only atomic energy facility in the country (Lucas Heights), using neutron activation analysis on a number of criminal cases. She left to join the Victoria Police Forensic Services Centre, initially working in the blood alcohol section, where she performed blood alcohol analyses. She transferred to the biology section, where she reported on a wide variety of cases involving biological evidence in major crime; this included attendance at scenes of crime and presenting expert evidence in courts of law. Concurrently, she obtained a postgraduate diploma in criminology and a master of arts in criminology, both from the University of Melbourne. She joined Forensic Alliance in England, where she performed similar work. She was employed at LGC Forensics in England, where she was a lead scientist. She has now returned to Australia where she is a forensic consultant and auditor with MRS Limited (www.mrslimited.com).

As a result of her presentation of a case study on hair and fiber transfer to the Australian and New Zealand Forensic Science Society annual meeting in 1994 in Auckland, she published a paper in the *Journal of Forensic Sciences*, which sparked her interest in the publication of case studies for the working forensic scientist. For her work on clothing damage analysis, she won a Young Investigators Award from the International Association of Forensic Sciences to attend their meeting in Tokyo in 1996. The following year, in recognition of her work on clothing damage and hairs, she was awarded an Australian Government Michael Duffy Travel Fellowship to attend international laboratories as well as the American Academy of Forensic Sciences meeting in New York. She visited the John Jay School of Criminal Justice, the FBI Laboratory and Academy, the Metropolitan Police Laboratory in London, and the Bundeskriminilat in Wiesbaden. She was invited to be on the inaugural committee of SWGHAIR (Scientific Working Group on Hair) under the auspices of the FBI, where she met her co-author Chesterene Cwiklik. Her main forensic interests are clothing damage, fiber and hair transfer, and blood pattern analysis at crime scenes.

Chesterene Cwiklik has been a forensic scientist in private practice since 1990 with Cwiklik & Associates, a laboratory specializing in trace evidence and small particle analysis, general criminalistics including incident reconstruction, and forensic consulting. Serving on the board and faculty of the Pacific Coast Forensic Science Institute since its inception in 1998, she is dedicated to teaching and research in forensic science. She has testified as an expert witness in numerous complex and high-profile cases, both criminal and civil, and has worked with the prosecution, plaintiff, and defense. She earned a bachelor of science in chemistry from Wheeling College in West Virginia (now Wheeling Jesuit University)

and did postgraduate work in organic chemistry at Wayne State University in Detroit. She began her career with the Detroit Police Department Crime Laboratory, beginning in the chemistry section analyzing controlled substances and developing latent prints, then transferring to the serology and trace evidence unit. Her interest in clothing examination was cemented while she was in the supervised casework portion of training and working on a narrow portion of a complex case with unknown suspects and an unknown scene. In the initial discussion, her supervisor, Mary Jarrett-Jackson, looked at a deposit and said, "Bet you a quarter that's a bean soup splash." She then sent the scientists in the unit home to cook a variety of beans. Together with trace evidence and bakery sheets, this eventually led police to the scene of two apparently separate murders.

Ms. Cwiklik later joined the Washington State Patrol Crime Laboratory in Seattle, where she set up and developed the trace evidence analysis program and was the head of the microanalysis section for 14 years. That section contained a fledgling program of methods development for analysis of incendiary materials from fire scenes. She collaborated closely with her supervisor and her peers in other sections, coordinating work, developing priority systems, evaluating equipment and recommending purchases, and implementing cross-training in different areas of specialty. She served on the Scientific Working Group on Materials (SWGMAT) that met under the aegis of the FBI laboratory, and she was on the earlier Committee on Forensic Hair Comparison. Both committees included international members. That is how she met her co-author, Jane Taupin.

Ms. Cwiklik is interested in the thought processes in forensic science, especially in trace evidence, and has published on the significance of trace evidence transfers and context-based examinations. She has a particular interest in heat damage to materials and has ongoing projects in that area. She has presented work involving fibers, hairs, debris, and thermal damage, as well as the significance of scientific evidence in the legal system, and has taught about forensic science to police officers, private investigators, lawyers, other forensic scientists, and the occasional university class.

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