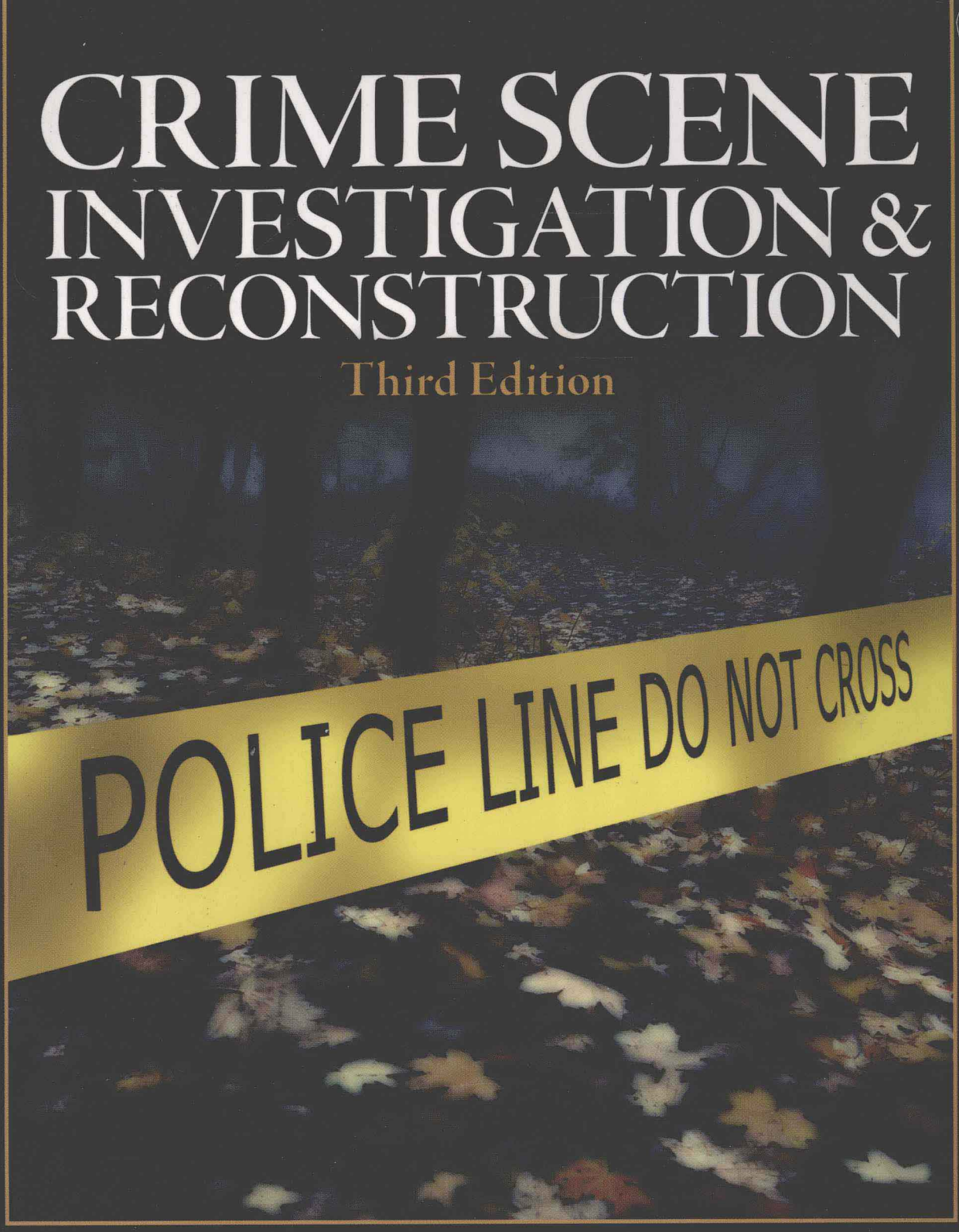
CRIME SCENE INVESTIGATION & RECONSTRUCTION

Third Edition



ROBERT R. OGLE, JR.

Third Edition

CRIME SCENE INVESTIGATION AND RECONSTRUCTION

Robert R. Ogle, Jr.

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FOREWORD

The issuance of the third edition of Robert Ogle's *Crime Scene Investigation and Reconstruction* is testimony to the high regard with which this textbook is held by both active crime scene investigators (CSIs) and academic instructors who are tasked with the responsibility of educating a new generation of criminal investigators. This new edition builds on the features of its predecessors. Most of the chapters have been updated and the text is replete with new photographs to illustrate key points regarding crime scene investigation. The author has added extensive information to the book regarding legal requirements for the collection of physical evidence.

Interest in the role of the modern CSI has been sparked not only by a spate of popular TV shows, but grows out of the realization that new technology has increased the effectiveness of the crime scene investigator. Recent studies have shown dramatic increases in success rates associated with the solving of burglaries and other property crimes as a result of recovering DNA evidence that a perpetrator may have simply touched. This news is already reinvigorating police to pursue investigations of scenes that in the past were assigned a low priority.

The role of the CSI is demanding. He/she must be capable of comprehending the scope of the crime scene and skilled at rapidly planning a strategy to extract all useful information from the crime site. At the same time, the CSI must be thoroughly familiar with the science underlying the laboratory examination of physical evidence. For, in truth, no matter how sophisticated a forensic laboratory may be equipped, or how well trained its scientists are, the failure of the CSI to recognize objects possessing evidential value at the crime scene and not knowing how these objects must be packaged and preserved for subsequent laboratory examination will prove fatal to the overall conduct of the investigation. Many horror stories can be cited to exemplify how botched efforts at the scene resulted in an unsolvable crime.

Merely reading Robert Ogle's work will not in itself produce a competent CSI. This must come with proper education, appropriate training, and mentored experience. But documentation protocols, fundamental collection and preservation techniques, and laboratory analytical strategies are appropriately discussed in this text. The book concludes with insights into how best to pull together all data and observations collected from the crime scene investigation into a coherent view of the events that occurred during the commission of a crime. To these ends, *Crime Scene Investigation and Reconstruction* will prove to be a valuable resource and essential instructional tool for practitioners, instructors, and students of crime scene investigation.

Richard Saferstein, Ph.D.

PREFACE

NEW TO THIS EDITION

- A chapter introduction and/or a chapter summary has been added to each chapter which lacks either (Chapters 1–3, 5–12, and 15).
- A total of thirty-nine new or re-drawn figures and photographs have been added to the chapters (Chapters 1 (1), 2 (2), 3 (8), 4 (5), 5 (9), 6 (6), 7 (4), 8 (2), and 13 (2).

Chapter 1 Introduction to Physical Evidence

- History of forensic science and physical evidence.
- Introduction of the "Linkage Profile" concept.
- Section on search and seizure laws.
- Section on admissibility requirements for expert testimony.
- New appendix on search and seizure laws, including *Brady* evidence and exclusionary rule.

Chapter 3 Crime Scene Photography

- New section on digital cameras.
- Glossary of photography terminology, especially for digital cameras.

Chapter 5 Latent Fingerprint Evidence

- New section on the history of the use of fingerprints for individual identification.

Chapter 6 Trace Evidence

- New figure for using Post-its™ to attach trace evidence to bindles.

Chapter 7 Biological Fluid Stain Evidence

- Figures for documentation of bloodstain patterns moved to Chapter 7 from Chapter 15.
- Sections on DNA evidence deleted and replaced with less technical explanations.
- Section on saliva evidence added.

Chapter 8 Firearms Evidence

- New figures to illustrate nomenclature of revolver and semi-auto pistol added.

Chapter 11 Document Evidence

- New table of sources for request exemplars added.

INTENT OF REVISIONS

The intent of the revisions for the third edition is to bring the materials up to date, to add an introduction and/or summary to each chapter lacking either in order to make the chapters uniform, and to make the text materials more easily understood by readers.

- New materials are added to reflect new information in the field of crime scene investigation.
- Nearly all chapters will now have both an introduction and summary for that chapter, providing uniformity for chapter structure.
- Revisions throughout the chapters were designed to make the materials more readily understood by students of crime scene investigation.

The third edition presents a great deal of new material in the first seven chapters of the text. New materials and illustrations are added to the remaining chapters in order to further clarify the essential aspects of those chapters. Key additions are explained here in the Preface.

A brief history of the development of criminalistics and forensic science has been added to Chapter 1. The concept of the linkage profile is introduced with an illustration to show the linkage between victim, suspect, primary and secondary scenes, suspect profiling, and suspect identification. In addition, extensive information regarding the legal requirements for the collection of physical evidence and its introduction into evidence at the courtroom level has been added to Chapter 1, including an appendix of search and seizure case law.

A brief history of the use of latent fingerprint impressions for the identification of the individual who left the impression has been added to Chapter 5 in order to acquaint the student with the long and convoluted development of this important class of physical evidence.

ABOUT THE AUTHOR

Robert Ogle attended the University of California in Berkeley, California, earning a Bachelor's degree in Letters and Science, with a major in Zoology. He attended several California State Universities as a graduate student in Biology and in Criminology. Mr. Ogle is the author of *O. J. Simpson: Not Guilty by Reason of Inanity;* and (with coauthor Michelle J. Fox) *Atlas of Human Hair Microscopic Characteristics*. He was a Criminalist with the Contra Costa County, California, Sheriff-Coroner and was a Criminalist and Managing Criminalist with the California Department of Justice before entering private practice as a forensic consultant. Also, he has served as a forensic consultant for defense counsel in a number of homicide cases, including *People v. Randy Kraft* (the largest serial murder case tried in the United States). He was a guest instructor in crime scene investigation courses in California Community Colleges and Law Enforcement Training Centers. Mr. Ogle has given many papers to forensic meetings and has published many articles in forensic journals and law enforcement publications. Currently retired from active teaching and consulting, he restricts his professional activities to writing in the field of forensic science.

ACKNOWLEDGMENTS

The author thanks the many individuals, both within and without the field of criminalistics, who have provided materials and support for this effort. The author thanks in particular Criminalist IV Bruce Moran, Sacramento County District Attorney's Forensic Laboratory; Criminalist Lucien (Luke) Haag, Forensic Science Services, Carefree, Arizona; Crime Scene Reconstructionist Alexander Jason, ANITE Productions Pinole, California; Deputy Inspector

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The author would like to acknowledge his reviewers Dana C. DeWitt, Mount Mary College; Steven Gilbert, SUNY at Canton; Caoimhin O Fearghail, Southwestern Oregon Community College; and Sandra K. Robertson, Tri County Technical College, whose many insightful suggestions provided immense assistance to him in his development of the third edition. Their suggestions demonstrated not only their commitment to excellence in the fields of crime scene investigation and forensic science, but also their acumen in these fields.

Last, but certainly not least, the author thanks Dr. Duayne Dillon, Chief (ret.), Contra Costa County Sheriff-Coroner Criminalistics Laboratory; John Murdock (former Chief, Contra Costa County Criminalistics Laboratory), Firearms Examiner, ATF laboratory, Walnut Creek, California; and Professor of Criminalistics (ret.) Dr. John Thornton, each of whose influence on this author can be seen in every page of this textbook, with the exception of any errors present, which are the sole responsibility of the author.

Robert Ogle
Forensic Scientist

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1 INTRODUCTION TO PHYSICAL EVIDENCE

Some circumstantial evidence is very strong, as when you find a trout in the milk.

Henry Thoreau, Unpublished Manuscripts, in Miscellanies, *Biographical Sketch* (1918), Vol. X, p. 30.

Key Words: Locard exchange principle, criminalistics, comparative analysis, recognized, collected, preserved, linkage profile, reconstruction, linkage, linkage triangle, investigative leads, physical nature, types of examinations, branch of examiners, class characteristics, class only, individual characteristics, identification, individualization, comparative analysis process, questioned, unknown source, known source, comparison standard, reference standard, exemplar, controls, objective, curtilage, probable cause plus, chain of possession, contamination.

INTRODUCTION

BRIEF HISTORY OF FORENSIC SCIENCE AND THE EXAMINATION OF PHYSICAL EVIDENCE

The inception of modern forensic scientific examination of physical evidence occurred in the field of toxicology (the scientific examination of poisons) in France, Sweden, Germany, and Spain, beginning in the 1770s through the early 1800s with the works of the Frenchman Fodere, the Swede Scheele, the German Ross, and the Spaniard Mathieu Orfila. Orfila's treatise on toxicology established forensic toxicology as a legitimate scientific endeavor.[1] In the mid-Nineteenth century, microscopic procedures for identifying sperm, a presumptive test for blood, and a microcrystalline test for hemoglobin were developed.[2] In the late nineteenth century, Alphonse Bertillon in France developed what he termed *anthropometry*, a system of bodily measurements used for personal identification, which was later replaced by the simpler and more accurate method of fingerprinting.[3]

The scientific examination of physical evidence and its application to criminal investigation was first described in the publication in 1893 of *Handbuch fur*

Untersuchungsrichter als System der Kriminalistik by Hans Gross, a prosecutor and judge in Austria (later published in English under the title *Criminal Investigation*).[4] The publication of this work by Gross marked the beginning of "Criminalistics" and the various forensic sciences as *professions.*

In the twentieth century, the pace of the development of scientific methods for examination of physical evidence increased considerably.[5] A method for the identification of ABO blood types in bloodstains was developed by Dr. Leone Lattes in Italy. In France, Edmond Locard, director of the Institute of Criminalistics in Lyons, described the theory that when two objects came into contact, there would be a cross-transfer of traces of materials. His theory became known as the **Locard exchange principle**, a central theme in the forensic sciences, especially those dealing with trace evidence (hairs, fibers, soil, etc.). In America, U.S. Army Colonel Calvin Goddard advanced firearms identification extensively by developing the use of the comparison microscope to compare bullets from a crime to bullets fired through a suspect's firearm. The comparison microscope was later used to compare hairs, fibers, and other types of trace evidence.

One of the major influences on crime scene investigation and physical evidence examination was the publication of *Techniques of Crime Scene Investigation* in the 1930s by the Swedish workers Svensson and Wendel (edited for several editions and now authored by Barry Fisher,[6] currently in its seventh edition). Another textbook of importance to crime scene investigation and criminalistics, *An Introduction to Criminalistics*: *An Application of the Physical Sciences to the Detection of Crime*,[7] was authored by Charles E. O'Hara and James W. Osterburg in 1952. The textbook *Homicide Investigations* by Dr. Lemoyne Snyder (third edition in 1977[8]) offered considerable useful information to those crime scene investigators and other investigators whose duties included the investigation of homicides.

In the middle of the twentieth century, the forensic science specialty known as **Criminalistics** achieved a watershed moment with the publication in 1953 of *Crime Investigation*[9] by Dr. Paul L. Kirk, a professor of Biochemistry and Criminalistics at the University of California at Berkeley, California. Dr. Kirk, called the "father of criminalistics," created the first generation of professional criminalists from his students at Berkeley. The professional field of criminalistics owes a debt of gratitude to Dr. Kirk (and his students) for the formation of the California Association of Criminalists (the first professional organization of criminalists), which has cultivated the ethical, moral, and scientific standards found in most professional criminalists and allied professionals today.

Subsequent to the publication of Kirk's textbook, many techniques were developed by forensic scientists for the determination of genetic markers in blood and semen stains, making a landmark leap with the development of DNA testing by Sir Alec Jeffreys in England. A further landmark in DNA testing was the development of the PCR technique to analyze forensic samples by Dr. Erlich, Dr. Higuchi of the Cetus corporation, and Dr. Edward T. Blake of the Forensic Science Associates laboratory.[10] These leaps in the identification and individualization of blood and other body fluids were followed in the last part of the twentieth century by the development of computer techniques to compare latent fingerprints to a fingerprint database (AFIS) and DNA from bloodstains and other

tissue stains from crime scenes to a database (CODIS) with blinding speed, two accomplishments thought entirely impossible at the midpoint of the twentieth century.

TYPES, VALUE, AND ADVANTAGES OF PHYSICAL EVIDENCE

Thoreau's quote in the beginning of this chapter embodies two types of evidence: (1) physical evidence (the trout) and (2) circumstantial evidence (the presence of the trout in the milk, which raises the presumption that the milk was diluted with creek water). Evidence is typically classified into (1) *direct evidence*, (2) *circumstantial evidence*, (3) *testimonial evidence*, and (4) *physical evidence*. These categories of evidence can overlap, as in the Thoreau quote mentioned earlier. The value of physical evidence comes from the data it provides for crime scene reconstruction, determining whether or not a crime occurred, linking an individual with another or with a crime scene, and investigative leads, and to link serial rapes, homicides, or burglaries. The advantages of physical evidence over other types of evidence include the factor that it is tangible, which means that a jury can view and touch the physical objects and can take the object(s) into the jury room and that some cases cannot be solved without the physical evidence. Further, physical evidence cannot be distorted by the defendant, it is not subject to memory loss, and the defendant can have the evidence examined by an expert of his/her choosing. Taken together, these advantages demonstrate that physical evidence is an important component of modern criminal and civil investigations. The types, value, and advantages of physical evidence are detailed and explained in the appropriate sections to follow.

CATEGORIES OF PHYSICAL EVIDENCE

Physical evidence is classified into divisions based on either the types of examinations performed (chemical, physical, microscopical, etc.) or on the type of material comprising the evidence (firearms, toolmarks, biological materials, etc.). In most jurisdictions, the forensic science laboratory is divided into sections based on the type of material examined, as described in the section on the major categories of physical evidence.

LABORATORY ANALYSIS OF PHYSICAL EVIDENCE

The laboratory analysis of physical evidence involves a wide variety of scientific methodologies, borrowed and adapted from the basic sciences, such as chemistry, physics, and biology. Laboratory examinations include the identification of the class and individual characteristics of the evidence from the victim, the suspect, and the crime scene. Typically, these methodologies are adapted to the **comparative analysis** (detailed later and in Figure 1-1) of the physical evidence; for example, comparison of the chemical analysis of the automotive paint found on a victim's clothing to the paint on a suspect's vehicle in a hit-and-run case, and the comparison of DNA from a suspect to DNA extracted from a vaginal swab from a rape victim. The laboratory analysis techniques for the various types of physical evidence are explained later and in the chapters for each of the physical evidence categories.