BOOK REVIEW

Peter R. De Forest,[1] *D.Crim.*

A Review of *Interpretation of Bloodstain Evidence at Crime Scenes*

REFERENCE: Eckert, W. G. and James, S. H., *Interpretation of Bloodstain Evidence at Crime Scenes,* Elsevier Science Publishing Co., New York, NY, 1989.

Crime scene reconstruction, and bloodstain pattern interpretation in particular, although potentially very powerful investigative approaches, are misunderstood, misused, and abused areas of forensic science. Misinformation abounds, and a coherent source of reliable information is needed. However, writing a text on crime scene reconstruction or bloodstain pattern interpretation is no easy task. If it were, such a text would probably have been written some time ago. Certainly, the importance of this area of forensic science has been widely recognized for about 20 years, largely as a result of Herbert MacDonell's publications and courses. Clearly, a book dealing with bloodstain pattern interpretation would be expected to be very welcome. Unfortunately, the present book does not deliver on the promise implicit in its title. It offers little in the way of scientific insight or discussions of general principles.

This book consists of seven chapters and four appendices. It is curiously organized. The book is not coauthored in the traditional sense. Only Chapter 1 is coauthored by the text's stated authors. One chapter is attributed solely to Dr. Eckert (Chapter 3), one is an anthology from several sources/contributors, one is unattributed, and the others are attributed to Mr. James. The emphases and organization are inappropriate. Only Chapter 2 (attributed to Mr. James) deals directly with the topic implied by the title, a chapter of 57 pages in a book of 367 pages. Less than one third of this chapter, the core of the book, consists of text. Can it be that the sum and substance of bloodstain pattern interpretation, in a text nominally devoted to the subject, is reducible to about 16 pages of text? In this core chapter, the coverage is uneven. Mr. MacDonell's 1971 pamphlet is organized in a more logical fashion and, despite some errors, provides a more detailed treatment.

Chapter 1 contains a brief overview of the history of forensic blood testing. All this would be known to forensic scientists and is too brief to be of value to investigators. In addition, the subject is presented in many readily available sources. Inexplicably, attention is devoted to disputed parentage testing. In addition, presumably as a result of sloppy proofreading, a portion of the discussion pertaining to bloodstains takes place under the heading for disputed parentage testing. This and some other observations suggest that the book was prepared rather hurriedly. Chapter 5 provides another more detailed

[1]Professor of criminalistics, Department of Sciences John Jay College of Criminal Justice, City University of New York, 445 West 59th St., New York, NY 10019.

overview of forensic serology. Again, this is peripheral to the main topic and has been discussed more adequately in other sources.

After Chapter 2, the next most relevant chapter, Chapter 3 (attributed to Dr. Eckert), may in fact be the most valuable. It provides useful ancillary information, including blood loss data, applicable to general crime scene reconstruction. It also underscores the need for cooperation among specialists in the various forensic sciences. Lamentably, an excellent book could have been build around subjects related to the contents of Chapters 2 and 3.

There is a voluminous alphabetical list (containing over 525 entries) of references given at the end of the book, which is neither annotated nor cited in the text. It apparently includes the references listed at the end of each chapter plus a number of additional ones. Neither the chapter references (listed alphabetically by author at the end of each chapter) nor the bibliography at the end are correlated with the remainder of the book. The majority of the references are either irrelevant to bloodstain pattern interpretation or are only marginally relevant. Incredibly, only 40 or so (<8%) deal with bloodstain pattern reconstruction or even closely related topics. Of these, only about 15 are from refereed scientific journals. Knowledgeable readers may wonder why other, more relevant references dealing with the physics and dynamics of liquid droplets are not included. A fairly extensive literature on the subject of liquid drop dynamics exists and is far more relevant than that in serology and blood banking. With the exception of two references on the subject of liquid drop dynamics in the forensic literature (not discussed in the text), the only other reference on liquid drop dynamics in general is one from a popular science magazine article (*Scientific American*) published in 1954.

The massive listing of references on serology appears to have been reproduced directly from a nonselective computer search. It is not clear that the authors have read even a portion of these. Many are quite old and peripheral to the main line of development of forensic serology. Blindly amassing and citing references without any attempt at critical evaluation or analysis is the antithesis of scholarship, as most undergraduates learn. A significant portion of the very small number of references listed that appear to deal with topics relating to bloodstain pattern interpretation comes from Eastern European and Soviet journals. A discussion of these would have been both interesting and useful. If numbers of references related to forensic serology are needed, Gaensslen's *Sourcebook in Forensic Serology, Immunology, and Biochemistry*, although somewhat dated, is a much better and far more meaningful compilation of useful and historical references in forensic serology. As noted above, the bulk of these serology references are out of place in this text. However, even more astounding is the inclusion of references for manuals published by vendors of clinical blood typing reagents, as well as such inclusions as an article entitled "Liability for Negligence in Blood Transfusions," published in an insurance magazine. The way in which these and the bulk of the other references are relevant to bloodstain pattern interpretation is not made clear.

In addition to the irrelevant references, much of what appears in the book could be classified as "filler." For example, Chapter 6 is a hodgepodge of "experimental studies" and "research" attributed to Mr. James and several other authors. Some of these are worthwhile but have been published previously and are readily available to interested readers. For example, an interesting computer program designed to aid in three-dimensional bloodstain pattern reconstructions, undoubtedly the harbinger of more sophisticated, graphics-based ones to come, is also discussed in this section, and a listing of the entire program appears in the Appendix without attribution. It was published previously in *Crime Laboratory Digest* (July 1987), but this article does not appear among the 500-plus references listed.

Two of the "studies" in Chapter 6 that have not been published previously are of questionable value. All scientists would agree that the appropriate place for publishing

significant experimental studies is in refereed journals. Relevant and salient points distilled from these are appropriately discussed in textbooks. This book includes two verbatim reports of "studies" conducted by individuals without any apparent scientific credentials. The reports are of dubious value and are clearly out of place in the book. In addition, it is extremely doubtful that these "studies" would be acceptable for publication in this or any other refereed scientific journal. Compounding matters further, the results and implications of several important and relevant published studies are not even mentioned, let alone discussed, although some are buried in the voluminous bibliography.

The book contains much additional "filler" in the form of a large number of poor-quality and marginally relevant photographs and case examples. There is a notable lack of a theoretical foundation on which to place the tedious collection of case examples. Generally, the photographs are of limited value with respect to illustrating the case reconstruction. Some are pointless (for example, Fig. 7-121) and depict items that are not essential, or even helpful, to an understanding of the case. Others are incorrectly labeled or are printed in the wrong orientation, additional evidence of sloppiness on the part of the authors' or the publisher's editorial staff. In a forensic science textbook, case examples should be chosen very carefully to underscore certain specific points. Authors and readers alike should realize that in any such text it is impossible, in the space normally allowed, to give the reader a fair and full appreciation of all the nuances in the case reconstruction. To attempt to do so can be misleading for any but the simplest of cases. Many of the cases presented are too complex to allow meaningful exposition in a reasonable amount of space. On the other hand, short excerpts from case examples can be useful to illustrate specific points concerning pitfalls, mistakes, or misinterpretations that have been made.

This book contains a number of errors and dangerously oversimplifies the process of bloodstain pattern interpretation. Some of the more obvious errors may be less dangerous but serve to illustrate conceptual gaps or sloppiness. For example, on page 59 Mr. James states that small droplets

> because of their *low density* travel only a short distance (2–3 feet) through air. . . . The larger droplets *of course* will travel a greater distance owing to their *higher density*.

(The italics have been added.) Hopefully, scientists reading this statement would know that the density of blood droplets does not vary with drop size and would know what the author is attempting to say. This might not be true for nonscientist investigators.

Evidence of additional sloppiness abounds with respect to terminology. The term "prone" is used repeatedly to mean either prone (in its most commonly accepted usage) or supine. Other terms are used inappropriately. Bloodstain pattern reconstruction is not solely a "medicolegal" problem, as is implied by the use of this limiting adjective at several junctures.

The sine table included in Appendix D, which lists the sines of angles to four decimal places for angles in half-degree increments, implies a degree of precision which could be very misleading when used by nonscientist investigators or even inexperienced scientists. The major and minor diameters of elliptical bloodstains are rarely measured to an accuracy of better than two significant figures. Even if more precise measurements of the dimension of droplet stain were possible, the degree of fit of the trigonometric model to the empirical data justifying its use has never been shown to be this accurate. The model is very useful for approximating angles, but the limitations implicit in its use must be recognized. A table with far fewer entries listing the sines of angles to two significant figures in five-degree increments would be more realistic and more helpful.

Some of the discussion of crime scene examination and documentation, although not without merit, is naive and is covered better in other references. Color photography is

recommended exclusively, with no discussion of the complementary and essential role of black-and-white photography. Testing of suspected bloodstains at crime scenes is cavalierly advocated. With a few, well-characterized, notable exceptions it is best to document bloodstains thoroughly at the scene and then transport them to the laboratory for testing by scientists under laboratory conditions with appropriate controls. Figures 4-4 and 4-5 contain omissions that could confuse investigators. It should come as no surprise that a minimum of two coordinates is required to specify any point in a two-dimensional rectangular coordinate system. Similarly, measurements by the triangulation scheme require triangles. No discussion of the appropriateness of these different systems of documentation to case situations is to be found.

Two disparate variants of hollowed-out polystyrene foam heads for simulations of human heads in spatter reconstructions are discussed. One such head, designed to be used in gunshot spatter investigations, is described in Chapter 6 by Mr. James. The other, covered with plaster, was used in the final case described in Chapter 7. The use of such devices to approximate the complex structure and properties of a human head is extraordinarily naive and misleading. Such a simulated head, although cursorily similar to a human head in relation to its gross external morphology, is not better than other, less pretentious, simulations that have been used in the past. What evidence is offered to justify its use? There must be explicit recognition that simulations, although often necessary, cannot hope to deal with the variables and complexities that arise in a real situation. Simply attempting to simulate a particular phenomenon does not necessarily produce any more meaningful data and can provide a false sense of security. In describing the use of a plaster-covered head in the final case example for Chapter 7, explicit recognition of the limitations of its use were lacking, although the limitations pertaining to the sand-weighted body attached to it were discussed. In fact, it would appear from the discussion that deviations from the desired result were conveniently attributed to this problem. This reviewer was retained by the District Attorney's office in this same case but was not made aware of Mr. James' reconstruction until it was published in the book. The case is almost not recognizable as described. Certainly, part of the problem is attributable to the point discussed earlier regarding the futility of attempting to provide meaningful insight into the reconstruction of a moderately complex case, given the constraints of space and limitations of black-and-white halftone reproductions of photographs in such a textbook. In the case described, more logical explanations for the bloodstain patterns found are apparent. There is no indication that Mr. James used his simulated head to test any alternate hypotheses. The consideration and full evaluation of alternate hypotheses is the essence of science but is, all too often, absent from bloodstain pattern interpretation work. For the inexperienced, seemingly "fancy" simulations often deflect attention away from failure to follow the scientific method. This must be guarded against. In addition, the design of simulations and the interpretation of the results obtained with such experiments are exceedingly complex and are proper roles for scientists, not investigators.

We must not lose sight of the fact that bloodstain pattern interpretations are an integral part of the overall process of crime scene reconstruction. They do not exist independently. A holistic approach to crime scene reconstruction is the most effective. This point receives insufficient emphasis. As noted earlier, much of the current level of recognition of the importance of bloodstain pattern interpretation is largely attributable to Mr. MacDonell's writings and to courses he has organized over the past two decades. The resulting increase in awareness has resulted in the processing and utilization of crucial evidence in many cases that would have been overlooked previously. However, unfortunately, there has been a very significant negative side to this increased awareness in terms of a lack of scientific rigor at the adjudicative level. Numbers of individuals without scientific backgrounds have been trained in these courses. With this type of training, these individuals

have stepped beyond this important investigative role to offer scientific evidence as expert witnesses in court. The danger inherent in this development cannot be overemphasized. No amount of experience can supplant scientific knowledge and a thought process based on careful adherence to the scientific method. The present book makes no distinction between the proper role for investigators and that for scientists and is likely to exacerbate rather than ameliorate this preexisting situation. In fairness, it should be pointed out that an additional dimension of the problem may be attributable to apathy on the part of forensic scientists. Too few forensic scientists have taken a leadership role in crime scene reconstruction. To some criminalists initially trained in other disciplines, such as chemistry, the crime scene is not viewed as being an integral part of the physical evidence analysis and interpretation problem, although for many this attitude changes with the acquisition of additional experience.

The present book does not meet the need for a text addressing the problems in the field and may do more harm than good. This is not to say that it does not have some positive qualities. The authors frequently caution about conservatism in interpretation. But curiously, this laudable conservatism appears to be lacking in some of the case examples that are presented. Although it is unlikely to be detrimental for experienced crime scene scientists, this book could be dangerous for inexperienced scientists or non-scientists with any degree of experience.