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## **1 INTRODUCTION**

### **1.1 Purpose and Scope**

- 1.1.1 The purpose of this document is to provide the Austin Police Department with qualified personnel capable of classifying stain patterns and providing scene reconstruction. It is intended to develop a person with a good scientific background into a qualified forensic examiner by providing the trainee with the knowledge and application of accepted procedures of bloodstain pattern analysis, as well as the legal significance and evidentiary value of the analysis.
- 1.1.2 The program will provide exposure to experimentations, tests, techniques, and procedures presently used and accepted by the courts and bloodstain pattern analysts. Additionally, it will provide exposure to the relevant literature available in the field. Exposure to legal aspects and testimony will be continuous throughout the training.
- 1.1.3 Upon completion of this course the trainee will be able to independently conduct complex examinations, convey conclusions both verbally and in writing, and provide effective court testimony as an expert witness.

### **1.2 Coordination of the Program**

- 1.2.1 The training coordinator will be an experienced examiner.
- 1.2.2 Any training should be arranged through the appropriate supervisor(s).

### **1.3 Training Period**

- 1.3.1 The length of the training period is a highly variable matter and will be left to the determination of the training coordinator. Certain individuals may require less time than others, depending on experience, education, or learning ability. The training time will vary depending on the time required to enroll the trainee in the proper adjunctive training courses.
- 1.3.2 Throughout the training period, the trainee will assist with casework, only under the direct supervision of a qualified examiner to familiarize the trainee with different forms of case evidence, documentation, packaging, and applied analytical techniques.

### **1.4 Location of Training**

- 1.4.1 The bulk of an individual's training will occur within the Division Laboratory.

## **1.5 Training Goals**

- 1.5.1 The training should culminate so that the trainee successfully completes the following modules.
- 1.5.2 The History of Bloodstain Pattern Analysis.
- 1.5.3 Bloodstain Pattern Analysis Terminology and Definitions.
- 1.5.4 Physical Properties of Blood.
- 1.5.5 Size, Shape and Distribution.
- 1.5.6 Common Pattern Types (Categories) and Spatter Characteristics.
- 1.5.7 Origin Determination.
- 1.5.8 Bloodstain Examination Equipment and Supplies.
- 1.5.9 Blood Detection.
- 1.5.10 Bloodstain Evidence Photography and Documentation.
- 1.5.11 Crime Scene Procedures and Documentation.
- 1.5.12 Examination Procedures.
- 1.5.13 Report Writing and Court Presentation.
- 1.5.14 Complete Competency Examination.
- 1.5.15 Complete Basic 40 hour Bloodstain Course.
- 1.5.16 Complete Advanced 40 hour Bloodstain Course.
- 1.5.17 Complete Crime Scene Section Blood Identification Training.
- 1.5.18 Complete Mock Trial.

## **1.6 Mock Trials**

- 1.6.1 Each case a forensic examiner analyzes has the potential of involving him/her as an expert witness in courtroom testimony. The trainee must never underrate this important aspect of the work. It is the training coordinator's responsibility to ensure that the trainee is thoroughly prepared for legal questioning. This can be done by a combination of mock trial, prearranged as well as impromptu question and answer sessions, pertinent literature review, and observation of courtroom testimony given by experienced examiners.
- 1.6.2 A mock trial may take place after the trainee has completed a block of this training protocol and a practical examination of a case incorporating that block of training.
- 1.6.3 After all phases of this training protocol have been satisfactorily completed; a final mock trial will incorporate all aspects of this training program and will be held subsequent to the final practical examination of a fabricated case.

## **1.7 Guidelines for Comprehensive Examination and Final Comprehensive Mock Trial**

- 1.7.1 Prior to the final mock trial, a technical examination of the trainee will be conducted by the training coordinator and Department management to ascertain the technical knowledge of the individual.
- 1.7.2 After the examination, supervision/management will assess the trainee's performance.
- 1.7.3 The outcome of the examination will be:
  - 1.7.3.1 Satisfactory.
  - 1.7.3.2 Not satisfactory.
    - 1.7.3.2.1 If the panel determines that the trainee's performance was not satisfactory, steps must be taken to effect the appropriate action.
- 1.7.4 A taped final mock trial will follow the successful completion of the technical examination.
- 1.7.5 The final mock trial will not exceed three (3) hours.
- 1.7.6 The atmosphere of the trial will be formal. That is, it will be conducted in the same manner as a real courtroom situation. This includes conduct, protocol, and all other aspects.

- 1.7.7 Harassment of the expert witness by defense counsel or prosecutor will be kept to the minimum necessary to achieve the desired goal. Questioning by both the prosecutor and defense attorney should be relevant and realistic.
- 1.7.8 The trial may be stopped at any time upon the request of any of the involved parties.
- 1.7.9 Immediately following the trial, the trainee may be released while the Division Manager or his designee, a Crime Scene Section Supervisor, and trial participants to evaluate the trainee's performance.
- 1.7.10 The outcome of the trial evaluation will be:
  - 1.7.10.1 Satisfactory.
  - 1.7.10.2 Not satisfactory.
    - 1.7.10.2.1 If the panel determines that the trainee's performance was not satisfactory, steps must be taken to effect the appropriate action.
- 1.7.11 This evaluation may be followed by a short performance critique.
- 1.7.12 The training coordinator will review the videotape with the individual as soon as possible. Other participants/observers should provide any comments to the training coordinator as soon as possible.

## **1.8 Supervised Casework**

- 1.8.1 After successfully completing all modules of this training manual, the trainee will begin supervised casework. All casework will be done at the direction of the training coordinator and/or Crime Scene Section Supervisor.
- 1.8.2 All of the newly qualified examiner's casework should be monitored for a period of at least six (6) months following authorization for supervised casework by the Division. All of the newly qualified examiner's reports must be reviewed prior to release by the supervisor or designee.
- 1.8.3 Supervised casework will be conducted in the following manner:
  - 1.8.1.1 Analysis through the use of photographs taken by the Crime Scene Section.
  - 1.8.1.2 Analysis in person at the crime scene.

This can only be conducted upon approval by the crime scene supervisor or the training coordinator.

- 1.8.1.2.1 The training coordinator or other qualified examiner will be present, if necessary, to supervise this task in the crime scene investigation.
- 1.8.1.2.2 The training coordinator will work with the trainee to ensure that all quality assurance measures are followed and that all work is performed according to prescribed standards.
- 1.8.1.2.3 The trainee will not issue a report outside that trainee's level of experience and knowledge. Reports may be completed by an experienced examiner using personal knowledge of the crime scene and/or documentation from the crime scene investigation.
- 1.8.1.2.4 The length of the supervised casework period is a highly variable matter and will be left to the determination of the training coordinator. Certain individuals may require less time than others, depending on experience, education, or learning ability.

## **1.9 Transition from Trainee to Examiner**

- 1.9.1 After the new bloodstain pattern analyst has successfully completed the training and supervised casework period, there follows a period of adjustment. The job of the training coordinator is to insure that this transition from training to real life takes place as smoothly as possible.
- 1.9.2 The supervisor, or designee, will accompany the newly qualified examiner to court for at least the first case and complete the appropriate testimony monitoring form.
- 1.9.3 Upon completion of the appropriate length of supervised casework as determined by the training coordinator, Crime Scene Section Supervisors and Division Management, the examiner will be given authorization to perform independent casework.

## **1.10 Instructions for the Training Coordinator**

- 1.10.1 The intent of the training program is to ensure that each and every trainee is provided with certain basic principles and fundamentals necessary for the complete education of a Bloodstain Pattern examiner. All of the listed topics must be incorporated into the program. However, education and prior experience of the trainee will be used as a guide to determine the amount of time devoted to each topic. Some of the topics will suggest an order of events and this ranking should be followed.

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- 1.10.2 The training coordinator will document the completion of each required training task by the trainee on the designated checklist for that aspect of training. The checklist for each training topic is located at the end of this training manual.
- 1.10.2.1 The completed checklists will be retained by the trainee in the appropriate sections of his/her training notebook.
- 1.10.2.2 One copy of all completed checklists will accompany the training coordinator's final report stating that all aspects of the training program have been completed satisfactorily.
- 1.10.2.3 The trainee will be evaluated on his/her performance during the course of the program. Evaluations will be produced on each case performed during supervised casework. Should a trainee demonstrate a deficiency which may impact successful completion of the training program, the Training Coordinator will notify the trainee's Supervisor and Division management within five working days.
- 1.10.3 The evaluation report should include:
- 1.10.3.1 A summation of the supervised casework performed during the timeframe.
- 1.10.3.2 An evaluation of the trainee's performance in the field.
- 1.10.3.3 An evaluation of the trainee's performance in the area of reconstruction and report writing.
- 1.10.3.4 The evaluation report will include:
- 1.10.3.3.1 Problem areas, as applicable, and their solutions or proposed solutions.
- 1.10.3.3.2 Trainee's strong points.
- 1.10.3.3.3 Trainee's weak points and suggested remedies.
- 1.10.3.3.4 Statement concerning trainee's overall performance.
- 1.10.3.3.5 Plans for the upcoming training/supervised casework.
- 1.10.4 This report will be in memorandum format. Each memorandum will become a part of the training history of the trainee and will be used to document the trainee's progress toward qualification.



- 1.10.5 When the trainee has satisfactorily completed all training requirements, an Employee Authorization form will be completed recommending that the person be qualified to perform supervised casework. If the trainee cannot meet the criteria expected of him\her during the period allowed for training in each of the areas, steps will be taken to effect the appropriate action.
- 1.10.6 When the trainee has satisfactorily completed all requirements of the supervised casework period, authorization for independent casework will be issued by Division Management.

## **1.11 Instructions for the Trainee**

- 1.11.1 The trainee is expected to keep a loose-leaf notebook on all work completed. The completed checklist for each training topic and the training coordinator's monthly reports will also be included in the notebook. This notebook will be checked monthly by the training coordinator.
- 1.11.2 The notebook should be organized by subject. Within each subject category, the types of tests, examinations or experiments observed and performed; notes and comments on each type of test; and the review of pertinent literature should be included.

## **1.12 Assessment/Training of Experienced Personnel**

- 1.12.1 Personnel will not be selected for this training program until they have completed the training program of the crime scene section, are performing casework in the crime scene discipline as a Crime Scene Specialist and have participated in at least two crime scene related proficiency testing cycles.
- 1.12.2 The responsibility for assessing the degree of qualifications of newly hired personnel who have previously successfully completed a qualifying training program of instruction in Bloodstain Pattern Analysis shall lie with the Section Supervisor, the Quality Assurance Manager and other designated management. In order to substitute for the entirety of the training specified in this manual, the qualifying course must have been formally structured, must have covered all appropriate facets of Bloodstain Pattern Analysis, must have been administered by a reputable organization (or individual), and the duration must not have been less than one year (full-time). Methods of verifying the completion or prior training could include reviewing the individual's job application, personal interview, review of transcripts or prior training records, checking references, consulting with previous training coordinators, administering a series of practical exams, and/or written and/or oral technical exams.
- 1.12.3 Newly hired personnel shall not be considered for independent casework by Division Management (or appropriate designee) to begin any actual casework until

each has successfully completed at least one competency test, consisting of a practical test, a technical examination and a final mock trial. Once the employee has been evaluated, the Section Supervisor shall provide a recommendation in writing to the Quality Assurance Manager who will forward a written recommendation to Division Management in accordance with the Quality Manual. A copy of the signed independent casework approval form shall be retained by the Section Supervisor. The employee's Supervisor should monitor the new employee's casework for a period of at least six (6) months following authorization by the Division. In addition, the supervisor, or designee, will accompany the newly qualified examiner to court for at least the first court appearance and complete the appropriate testimony monitoring form.

### **1.13 Orientation**

- 1.13.1 Before beginning the training program, an orientation of the bloodstain pattern analysis training program and function will be conducted. In addition, all documents governing the bloodstain analysis program will be identified to the trainee.
  
- 1.13.5 The duties of a forensic bloodstain pattern analyst will be clarified.

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## **2 The History of Bloodstain Pattern Analysis**

### **2.1 Objectives**

- 2.1.1 To understand the evolution of the Bloodstain Pattern Analysis discipline.
- 2.1.2 To understand the work of Dr. Eduard Piotrowski in Vienna in 1985.
- 2.1.3 To understand the work of early American Scientists who studied the Bloodstain Pattern discipline (Dr. Paul L. Kirk & Prof. Herbert L. MacDonell)
- 2.1.4 To understand the current status & developments within the discipline.
- 2.1.4 To understand the value of Bloodstain Pattern Analysis as it relates to Criminal Investigations.
- 2.1.5 To understand the role of the “International Association of Bloodstain Pattern Analysts”.

### **2.2 Methods of Instruction**

- 2.2.1 Lecture/Discussion/Literature Reading
  - 2.2.1.1 The lecture and discussion will include historical information presented in the Literature References mentioned in Section 2.2.2
- 2.2.2 Literature
  - 2.2.2.1 MacDonell, H. L., “Flight Characteristics and Stain Patterns of Human Blood”, Washington, U. S. Department of Justice, LEAA, N.I.L.E.C.J., 1971
  - 2.2.2.2 MacDonell, H. L., “Bloodstain Pattern Interpretation”, Washington, U. S. Department of Justice, LEAA, N.I.L.E.C.J., 1971
  - 2.2.2.3 Eckart, W.G. and James, S. H., Interpretation of Bloodstain Evidence at Crime Scenes, New York, Elsevier, 1989
  - 2.2.2.4 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002
  - 2.2.2.5 MacDonell, H. L., “Segments of History: The Literature of Bloodstain Pattern Interpretation Segment 00: Literature through the 1800’s”, IABPA Newsletter

- 2.2.2.6 MacDonell, H.L., “Segments of History in the Documentation of Bloodstain Pattern Interpretation” Segment 01: 1901-1910”, IABPA Newsletter
- 2.2.2.7 MacDonell, H.L., “Segments of History: The Literature of Bloodstain Pattern Interpretation Segment 02: Literature from 1911 through 1920”, IABPA Newsletter
- 2.2.2.8 MacDonell, H.L., “Segments of History: The Literature of Bloodstain Pattern Interpretation Segment 03: Literature from 1921 through 1930”, IABPA Newsletter
- 2.2.2.9 MacDonell, H.L., “Balthazard was great, but he didn’t string us along”, IABPA Newsletter

### 2.2.3 Evaluation/Assignment

- 2.2.3.1 Read the four segments prepared by Professor Herbert L. MacDonell (2.2.2.5 – 2.2.2.8). Choose three events that are felt to be significant to the advancement of bloodstain analysis. Describe thoroughly in writing what challenges and advantages these events will have in work as a bloodstain analyst.
- 2.2.3.2 Literature Study – Prepare a paper on a particular aspect of Bloodstain History.

## 2.3 Modes of Evaluation

- 2.3.1 Review and grading of assignments.
- 2.3.2 Question and answer session.

### **3 BLOODSTAIN PATTERN ANALYSIS TERMINOLOGY & DEFINITIONS**

#### **3.1 Objectives**

3.1.1 To understand and become familiar with the accepted terminology used in the Bloodstain Pattern Analysis field, in accordance with the IABPA (International Association of Bloodstain Pattern Analysts) and SWIGFAST (Scientific Working Group on Bloodstain Pattern Analysts).

3.1.2 To understand how terminology applies to case situations and written reports.

#### **3.2 Methods of Instruction**

##### **3.2.1 Discussion**

3.2.1.1 Bloodstain terminology and definitions will be discussed in accordance with the exercise 3.2.2.1

##### **3.2.2 Assignments**

3.2.2.1 A packet will be provided that includes three different bloodstain terminology lists recommended by the I.A.B.P.A. from 1985, 1996 and 2011. Read this information to become familiar with bloodstain terms. Compare the differences and slight changes throughout the years for preferences in regard to phrasing and defining. The assignment is to take the current terminology listed in Chapter 17 of the Crime Scene Section SOP and write a description which will compare and contrast the Division working definitions to the other terminology lists.

#### **3.3 Modes of Evaluation**

3.3.1 Review and grading of assignments.

3.3.2 Question and answer session.

## **4 PHYSICAL PROPERTIES OF BLOOD**

### **4.1 Objectives**

- 4.1.1 To learn the components of blood as they relate to the study of Bloodstain Pattern Analysis.
- 4.1.2 To understand the principles of fluid dynamics as they relate to the study of Bloodstain Pattern Analysis.
- 4.1.3 To understand the principles of physics as they relate to the study of Bloodstain Pattern Analysis.

### **4.2 Methods of Instruction**

#### **4.2.1 Discussion/Lecture**

- 4.2.1.1 Fluid Dynamics (cohesion, surface tension and viscosity)
- 4.2.1.2 Drying time
- 4.2.1.3 Clotting time
- 4.2.1.4 Volume of Blood drops
- 4.2.1.5 Size of stain
- 4.2.1.6 Surface effects
- 4.2.1.7 Terminal velocity
- 4.2.1.8 Effect of Blood Thinners
- 4.2.1.9 Capillary action

#### **4.2.2 Review of Videos**

- 4.2.2.1 Movement & the Center of Gravity, Introductory Concepts In Physics, 1987 Films for the Humanities & Sciences, Inc.
- 4.2.2.2 Falling Motion, Introductory Concepts In Physics, 1987 Films for the Humanities & Sciences, Inc.
- 4.2.2.3 Inertia, Introductory Concepts In Physics, 1987 Films for the Humanities & Sciences, Inc.

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- 4.2.2.4 Introduction to Relative Motion, Introductory Concepts In Physics, 1987 Films for the Humanities & Sciences, Inc.
  - 4.2.2.5 Momentum, Introductory Concepts In Physics, 1987 Films for the Humanities & Sciences, Inc.
  - 4.2.2.6 Blood In Motion, Aspects of Bloodstain Analysis, Metropolitan Police Forensic Science Laboratory, London, 1993
  - 4.2.3 Literature Reference
    - 4.2.3.1 Wonder, A.Y., Blood Dynamics, Academic Press, 2001
    - 4.2.3.2 Anderson, J. W., “Capillarity Distortion Analysis”  
IABPA 1993 Annual Training Conference Bloodstain Pattern Training Manual DFS Document 244-D200
    - 4.2.3.3 Hurley, M. N., Pex, J. O. “Sequencing of Bloody Shoe Impressions by Blood Spatter and Blood Droplet Drying Times”, Oregon State Police Crime Laboratory
    - 4.2.3.4 White, B., “Bloodstain Patterns on Fabrics: The Effect of Drop Volume, Dropping Height and Impact Angle”, Can. Soc. Forensic Science J. Vol.19, No. 1 (1986)
    - 4.2.3.5 Christman, D. V., “A Study to Compare and Contrast Animal Blood to Human Blood Product” Snohomish County Medical Examiner’s Office, Washington
    - 4.2.3.6 Pizzola, P. A., Roth, S. and Deforest, P. R., “Blood Droplet Dynamics – I and II” Journal of Forensic Sciences, JFSCA, Vol.31 No.1, Jan. 1986 pp. 36-49
    - 4.2.3.7 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002
    - 4.2.3.8 James, S., “Scientific and Legal Applications of Bloodstain Pattern Interpretation”, CRC Press, 1999
    - 4.2.3.9 Eckert, W. and James, S., Interpretation of Bloodstain Evidence at Crime Scenes, New York, CRC Press 1999

#### 4.2.4 Assignments/Experimentation

4.2.4.1 Several articles and handout materials referencing miscellaneous aspects of fluid dynamics have been provided. Review this information and prepare a brief written outline of aspects and issues to be discussed. Fluid dynamics will be discussed and how these physical properties influence stains and the interpretation of them.

#### 4.2.4.2 Passive Drops from different heights

4.2.4.2.1 Using a pipette release three drops on each target surface at heights of 3 inches, 6 inches, 12 inches, 24 inches, 36 inches, 48 inches, and 60 inches.

4.2.4.2.2 Target surfaces include Tile, Carpet, Brick, Blotter Paper, Glass, and Poster Board.

4.2.4.2.3 Document with notes and photography each target surface result at each height.

4.2.4.2.4 Note the type of disruption created when each stain hits the surface (smooth edges, scalloped, spines, satellites, or combination).

4.2.4.2.5 Once dry, measure each diameter measurement in millimeters.

#### 4.2.5 Evaluate blood drop stains on fabrics mounted on cardboard.

4.2.5.1 Fabrics include water repellant treated sheet (Skotch Guard), a paper towel, a bath towel, panty hose (panty & hose materials), cotton/polyester sheet, and the outside surface of worn jeans.

4.2.5.2 Document, through descriptive notes, the differences in appearance of the stains and the potential influence of the fabric on the stain appearance.

#### 4.2.6 Different originating surfaces.

4.2.6.1 Use these tools to coat a surface with blood for dripping experiment: knife, wooden board, tire iron, hammer, screwdriver, switch blade, butcher knife.

4.2.6.2 Use at least two different surfaces on each tool to allow blood to drip.



- 4.2.6.3 Drip at least three drips from each surface.
- 4.2.6.4 Allow blood to drip without movement of the tool.
- 4.2.6.5 Document the stain sizes and compare with other originating surfaces.
- 4.2.7 Drip pattern on different surfaces.
  - 4.2.7.1 Use a tile floor, paper, carpet, and a sidewalk for the surfaces.
  - 4.2.7.2 Drip one drop at a time (blood into blood) into the same area until 5 ml is used.
  - 4.2.7.3 Document the amount of satellite spatter created at the different stages of the drip pattern and contrast the surface influence.
- 4.2.8 Larger volume drops on different surfaces.
  - 4.2.8.1 Use a tile floor, paper, carpet, and a sidewalk for the surfaces.
  - 4.2.8.2 Drop the entire 5 ml volume all at once.
  - 4.2.8.3 Document the characteristics of each stain pattern and contrast to the patterns created by one drop at a time.
- 4.2.9 Horizontal movement at different speeds and different heights.
  - 4.2.9.1 From a height of 3 to 6 inches from a papered surface, allow blood to drip off fingers while traveling at a brisk walk for a distance of 6 to 10 feet.
  - 4.2.9.2 From a height at knee level from a papered surface, allow blood to drip off fingers while traveling at a brisk walk for a distance of 6 to 10 feet.
  - 4.2.9.3 From a height of waist level from a papered surface, allow blood to drip off fingers while traveling at a brisk walk for a distance of 6 to 10 feet.
  - 4.2.9.4 Do the same experiments from the same heights but increase speed to a rapid pace much faster than a brisk walk.

4.2.9.5 Document the differences in sizes, shapes, and satellite spatter created between the heights and the difference in travel speed.

4.2.10 Hands moving while dripping blood swinging back and forth.

4.2.10.1 Walk and swing bloody hands over some butcher block paper on the floor.

4.2.10.2 Document observations.

### **4.3 Modes of Evaluation**

4.3.1 Review and grading of assignments.

4.3.2 Question and answer session.

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## **5 SIZE, SHAPE AND DISTRIBUTION**

### **5.1 Objectives**

- 5.1.1 To understand the distinguishing characteristics related to size, shape and distribution of bloodstain evidence.
- 5.1.2 To understand how the characteristics of size, shape and distribution assist in the analysis of bloodstain evidence.

### **5.2 Methods of Instruction**

- 5.2.1 Lecture and Discussion
  - 5.2.1.1 Size Determination
  - 5.2.1.2 Shape Determination
  - 5.2.1.3 Measurements and angle-of-incidence Determination
  - 5.2.1.4 Distribution Determination

### **5.3 Literature References**

- 5.3.1 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002
- 5.3.2 James, S., “Scientific and Legal Applications of Bloodstain Pattern Interpretation”, CRC Press, 1999
- 5.3.3 Eckert, W. and James, S., Interpretation of Bloodstain Evidence at Crime Scenes, New York, CRC Press 1999
- 5.3.4 MacDonell, H.L., Bloodstain Patterns. 1993, Corning, New York: Laboratory of Forensic Science. xvi, 182.
- 5.3.5 Adair, Thomas W., “False Wave Cast-Off; Considering the Mechanisms of Stain Formation” Arapahoe County Sheriff’s Office, Littleton, CO.
- 5.3.6 Stephens, B. G., M.D. and Allen, T. B., M.D., “Back Spatter of Blood from Gunshot Wounds – Observations and Experimental Simulation” Journal of Forensic Sciences. JFSCA Vol.28 No.2 April 1983 pp 437-439
- 5.3.7 Christman, D.V., “Expired Bloodstain Patterns” Snohomish County Medical Examiner Medicolegal Death Investigator

- 5.3.8 Slemko, J.A., “BLOODSTAINS ON FABRIC, The Effects of Droplet Velocity and Fabric Composition”, IABPA Newsletter
- 5.3.9 MacDonnel, H.L., “On Measuring the Volume of Very Small Drops of Fluid Blood and Correlation of this Relationship to Bloodstain Diameter”, IABPA Newsletter
- 5.3.10 MacDonnel, H.L., “Cohesion, Wettability, and Blood Drops that Land on a Smooth, Hard Surface”, IABPA Newsletter
- 5.3.11 Brady, T. and Tigmo, J., “Extreme Temperature Effects on Bloodstain Pattern Analysis”, IABPA Newsletter

## **5.4 Experiments**

- 5.4.1 Compare balloon pop results to static pool struck with blunt object
  - 5.4.1.1 Using balloons supplied to you, pop one at each distance away from the wall at distances of 6”, 18”, 24”, and 36”.
  - 5.4.1.2 Each balloon should contain a small amount of blood inside (~ ¼ of a glass pipette).
  - 5.4.1.3 Document the difference in sizes, shapes, and distribution of the stains between each distance.
  - 5.4.1.4 Document a size range and a predominant stain size.
  - 5.4.1.5 Be sure to document floor pattern observations also.
- 5.4.2 Wood striking a static pool
  - 5.4.2.1 Take a wooden board and strike an amount of blood on an elevated surface approximately 1 foot from a wall.
  - 5.4.2.2 Document observations of the changes to the static pool.
  - 5.4.2.3 Document the sizes, shapes, and distribution of the stains on the wall and floor.
  - 5.4.2.4 Document a size range and a predominant stain size.
  - 5.4.2.5 Be sure to document floor pattern observations also.

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5.4.3 Have blood drawn & create expired patterns

- 5.4.3.1 Cough – place blood in mouth and start coughing at each distance.
- 5.4.3.2 Stand 6”, 18”, 24”, and 36” away from the wall.
- 5.4.3.3 Document your observations.
- 5.4.3.4 Be sure to document floor pattern observations also.
- 5.4.3.5 Compare coughing observations to results from balloon pop experiments.
- 5.4.3.6 Sneeze – place blood in mouth and emulate sneeze at each distance.
- 5.4.3.7 Stand 6”, 18”, 24”, and 36” away from the wall.
- 5.4.3.8 Document your observations.
- 5.4.3.9 Be sure to document floor pattern observations also.
- 5.4.3.10 Compare sneezing observations to results from coughing experiments.
- 5.4.3.11 Compare sneezing observations to results from balloon pop experiments.
- 5.4.3.12 Spit – place blood in mouth and spit at each distance.
- 5.4.3.13 Stand 6”, 18”, 24”, and 36” away from the wall.
- 5.4.3.14 Document your observations.
- 5.4.3.15 Be sure to document floor pattern observations also.
- 5.4.3.16 Compare spitting observations to results from coughing and sneezing experiments.
- 5.4.3.17 Compare spitting observations to results from balloon pop experiments.

5.4.4 Compare impact and expired observations to drip pattern satellites created in experiments in 4.2.7

5.4.5 Create a hand clap impact

- 5.4.5.1 Place a small amount of blood on the palm and clap creating spatter on wall at each distance.
- 5.4.5.2 Stand 6", 18", 24", and 36" away from the wall.
- 5.4.5.3 Document your observations.
- 5.4.5.4 Be sure to document floor pattern observations also.
- 5.4.5.5 Compare to results from previous experiments.
- 5.4.6 Finger flicks
  - 5.4.6.1 Cover fingers on one hand and 'flick' fingers creating spatter patterns.
  - 5.4.6.2 Stand 6", 18", 24", and 36" away from the wall.
  - 5.4.6.3 Document your observations.
  - 5.4.6.4 Be sure to document floor pattern observations also.
  - 5.4.6.5 Compare to results from previous experiments.
- 5.4.7 Dropped items into static pool.
  - 5.4.7.1 Drop a heavy item into a static pool from each distance.
  - 5.4.7.2 Drop from 6", 18", 24" and 36" above the floor.
  - 5.4.7.3 Document your observations.
  - 5.4.7.4 Be sure to document wall pattern observations also.
  - 5.4.7.5 Repeat experiment with a lighter item.
  - 5.4.7.6 Document your observations.
  - 5.4.7.7 Compare to results from all previous experiment.
- 5.4.8 Stepping into a static pool.
  - 5.4.8.1 Create a pool of blood on the floor using approximately 5 ml of blood.

- 5.4.8.2 Step gently into the pool of blood.
- 5.4.8.3 Document your observations of the alteration of the static pool.
- 5.4.8.4 Document your observations of any spatter/stains created.
- 5.4.8.5 Document your observations of the shoe used to step into the pool.
- 5.4.8.6 Document your observations of the clothing worn at the time.
- 5.4.8.7 Repeat the experiment creating a new pool of blood and now stomping into the static pool.
- 5.4.8.8 Document all previously described observations.
- 5.4.8.9 Repeat the experiment creating a new pool of blood and now jumping into the static pool.
- 5.4.8.10 Document all previously described observations.
- 5.4.9 Simulated arterial.
  - 5.4.9.1 Using the supplied syringe and tube, release amount on wall from each distance and each angle.
  - 5.4.9.2 Stand 6", 18", 24", and 36" away from the wall.
  - 5.4.9.3 Use an approximate 20 degree angle, a 45 degree angle, and a 90 degree angle when spurting toward the wall.
  - 5.4.9.4 Document your observations.
  - 5.4.9.5 Using the supplied syringe and tube, release the total amount in the syringe while moving it from left to right.
  - 5.4.9.6 Document your observations.
  - 5.4.9.7 Using the supplied syringe and tube, release amount toward the floor from each distance and each angle.
  - 5.4.9.8 Spurt 6", 18", 24", and 36" above the floor.
  - 5.4.9.9 Use an approximate 20 degree angle, a 45 degree angle, and a 90 degree angle when spurting toward the floor.

- 5.4.9.10 Document your observations.
- 5.4.9.11 Repeat the vertical and horizontal surface experiments varying the amount of pressure used to force the plunger in the syringe.
- 5.4.9.12 Document your observations.
- 5.4.9.13 Compare the results.
- 5.4.9.14 Arterial Rain – Release the blood in the syringe in straight forward manner the length of the room.
- 5.4.9.15 Document your observations of the stains created on the floor between the location of the syringe and the far wall.
- 5.4.9.16 Document your observations of the pattern created on the far wall.

## **5.5 Assignments**

- 5.5.1 Please read the seven articles listed in 5.3 and write answers to the following questions:
  - 5.5.1.1 What are distinct characteristics between “low”, “medium”, and “high” velocity impact patterns?
  - 5.5.1.2 What other events may produce stain patterns with characteristics of impact?
  - 5.5.1.3 What are the effects of porous/non-porous and smooth/textured target surfaces?
  - 5.5.1.4 In your opinion what would be proper to state in a written report?
- 5.5.2 Describe in writing how the experiment observations influenced the answers to the questions in 5.5.1.

## **5.6 Modes of Evaluation**

- 5.6.1 Review and grading of assignments.
- 5.6.2 Question and answer session.



## **6 COMMON PATTERN TYPES**

### **6.1 Objective**

6.1.1 To understand how the size, shape and distribution of stains at the scene or found on items of evidence allows stains to be placed in one of five categories.

6.1.1.1 Passive (falling dripping)

6.1.1.2 Projected

6.1.1.3 Arterial

6.1.1.4 Impact

6.1.1.5 Contact Transfer

### **6.2 Methods of Instruction**

6.2.1 Lecture & Discussion

6.2.1.1 Bloodstains fall into one of five major categories.

6.2.2 Literature References

6.2.2.1 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002

6.2.2.2 James, S., Scientific and Legal Applications of Bloodstain Pattern Interpretation, CRC Press, 1999

6.2.2.3 Eckert, W. and James, S., Interpretation of Bloodstain Evidence at Crime Scenes, New York, CRC Press 1999

6.2.2.4 Bunker, J., Bloodstain Evidence Manual, Doje Press, 1998

6.2.2.4 Bevel, T., "Geometric Bloodstain Interpretation" FBI Law Enforcement Bulletin, May 1983

6.2.3 Experiments

6.2.3.1 Cast-off experiments

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- 6.2.3.1.1 Using a ball bat, spread ample blood on the surface and perform a full overhead swing.
  - 6.2.3.1.2 Document the results and record your observations.
  - 6.2.3.1.3 Using a ball bat, spread ample blood on the surface and perform a full batters sideways swing.
  - 6.2.3.1.4 Document the results and record your observations.
  - 6.2.3.1.5 Using a ball bat, spread ample blood on the surface and perform an action of sudden termination in the swing of the bat.
  - 6.2.3.1.6 Document the results and record your observations.
  - 6.2.3.1.7 Perform sideways swing cast-off patterns using a hammer, your arm with your fingers spread apart, your arm with your fingers tight together, a board, and a knife.
  - 6.2.3.1.8 Document the results and record your observations.
  - 6.2.3.1.9 Compare the characteristics between the cast-off patterns.
  - 6.2.3.2 Hand Contact experiments
    - 6.2.3.2.1 Place blood on your hand and hit the wall with some force with the palm side of your hand.
    - 6.2.3.2.2 Document the results and record your observations.
    - 6.2.3.2.3 Place blood on your hand and touch the wall with the palm side of your hand.
    - 6.2.3.2.4 Document the results and record your observations.
    - 6.2.3.2.5 Compare and contrast the differences in the patterns created.
    - 6.2.3.2.6 First wet your hand, then place blood on your hand and hit the wall with some force with the palm side of your hand.

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- 6.2.3.2.7 Document the results and record your observations.
  - 6.2.3.2.8 First wet your hand, then place blood on your hand and touch the wall with the palm side of your hand.
  - 6.2.3.2.9 Document the results and record your observations.
  - 6.2.3.2.10 Compare and contrast the differences between all the contact patterns created.
  - 6.2.3.2.11 Repeat the previous contact experiments using the back of your hand instead of the palm side of your hand.
  - 6.2.3.2.12 Document the results and record your observations.
  - 6.2.3.2.13 Compare and contrast the differences between all the contact patterns created.
  - 6.2.3.3 Contact with fabric
    - 6.2.3.3.1 Use a bloodied towel and perform a contact transfer using the palm side of your hand.
    - 6.2.3.3.2 Document the results and record your observations.
    - 6.2.3.3.3 Use a bloodied towel and perform a contact transfer using the back side of your hand.
    - 6.2.3.3.4 Document the results and record your observations.
    - 6.2.3.3.5 Compare and contrast the differences between the contact patterns.
  - 6.2.3.4 Contact with wig
    - 6.2.3.4.1 Place blood on a wig and let sit for the following times before touching the wig to the wall.
    - 6.2.3.4.2 Use times of 10 seconds, 20 seconds, 30 seconds, and 1 minute.
    - 6.2.3.4.3 Document the results and record your observations for each time interval.

- 6.2.3.4.4 Place some blood on the wig and swipe it on the vertical surface.
- 6.2.3.4.5 Document the results and record your observations.
- 6.2.3.4.6 Place some blood on the wall and wipe through it with the wig.
- 6.2.3.4.7 Document the results and record your observations.
- 6.2.3.4.8 Place some blood on the wall, wait 5 minutes, wipe through it with the wig.
- 6.2.3.4.9 Document the results and record your observations.

#### 6.2.4 Exercises

- 6.2.4.1 Complete observation notes in reference to the Swipe & Impact Pattern Sequence posters. Determine the sequence of the patterns and record reasoning for the determination.
- 6.2.4.2 Complete observation notes in reference to the Expired versus Impact posters. Record the characteristics which allow you to distinguish the difference in the mechanism creating the patterns.
- 6.2.4.3 Complete observation notes in reference to Mechanism/Pattern match exercise. Record the characteristics which allow you to distinguish the type of event or mechanism which created the pattern.
- 6.2.4.4 Complete observation notes in reference to the Swipe Directionality posters. Record the characteristics which allow you to distinguish the direction of the movement creating the patterns.

#### 6.2.5 Assignments

Conduct the following projects and submit a report of your findings:

- 6.2.5.1 Select a minimum of five (5) different weapons and conduct cast off research/experimentation. Compare the type of stains produced and prepare a project report on your findings. Submit a report on your observations. The report

must also include the backup research documentation to support your observations and conclusions.

6.2.5.2 Select a minimum of five (5) different target surfaces (both vertical and horizontal) and conduct arterial spurt research/experimentation. Compare the type of stains produced and prepare a project report on your findings. Submit a report on your observations. The report must also include the backup research documentation to support your observations and conclusions.

6.2.5.3 Select a minimum of five (5) different fabrics for target surfaces and perform research/experimentation by depositing bloodstains on the different fabrics from different heights and angles. Compare the type of stains produced and prepare a project report on the effects of fabrics on bloodstain appearance at various heights and impact angles. Submit a report on your observations. The report must also include the backup research documentation to support your observations and conclusions.

6.2.5.4 Review case photographs provided to you and record at least three observations which will be imperative to reviewing bloodstain patterns.

### **6.3 Mode of Evaluation**

6.3.1 Review and grading of exercises, experiments, and assignments.

6.3.2 Question and Answer Session.

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## **7 ORIGIN DETERMINATION**

### **7.1 Objectives**

- 7.1.1 To understand the validity and usefulness of a source of origin determination in case work.
- 7.1.2 To understand the multiple ways to determine and/or document a three dimensional blood source and to be able to discuss the advantages & disadvantages of these techniques.

### **7.2 Method of Instruction**

#### **7.2.1 Lecture and Discussion**

- 7.2.1.1 String Reconstruction of an Impact (see Section 7 in the Bloodstain Procedures Manual)

#### **7.2.2 Literature References**

- 7.2.2.1 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002
- 7.2.2.2 James, S., Scientific and Legal Applications of Bloodstain Pattern Interpretation, CRC Press, 1999
- 7.2.2.3 Eckert, W. and James, S., Interpretation of Bloodstain Evidence at Crime Scenes, New York, CRC Press 1999
- 7.2.2.4 Bunker, J., Bloodstain Evidence Manual, Doje Press, 1998
- 7.2.2.5 Fischer, W., "Addressing Bloodstains in a Three Dimensional Coordinate AXIS System", IABPA Newsletter
- 7.2.2.6 Chafe, F., "The Tangent Method and Spreadsheets – Determining Point or Area of Origin in Bloodstain Pattern Analysis", IABPA Newsletter
- 7.2.2.7 Pace, A., "The Relationship between Errors in Ellipse Fitting and the Increasing Degree of Error in Angle of Impact Calculations", IABPA Newsletter
- 7.2.2.8 Chafe, F., "Determination of Impact Angle Using Mathematical Properties of the Ellipse", IABPA Newsletter

- 7.2.2.9 Podworny, E. J. and Carter, A. L., “Bloodstain Pattern Analysis with a Scientific Calculator”, JCSFS, March 1990

**7.2.3 Assignment**

- 7.2.3.1 Write a paper on the validity and usefulness of a source of origin determination in case work after reading the articles packet (Literature References 7.2.2). Review the multiple ways to determine and/or document a three-dimensional blood source and prepare as part of your paper discussion on the advantages or disadvantages of the different ways.

**7.2.4 Exercise**

- 7.2.4.1 In order to better prepare for an eventual mock court situation, as well as, future crime scene work, practical exercises will be incorporated into the bloodstain analyst training curriculum. The trainee will be given an impact pattern to string back to a source of origin. Documentation to be turned in should include: (1) descriptions of the stain pattern, (2) the measurements and mathematical figures for your chosen ten stains, (3) the height, distance from an adjacent wall, and the range from a wall for the blood source, and (4) the mathematical workup validating the source location utilizing the tangent method on three of your chosen stains.

**7.3 Modes of Evaluation**

- 7.3.1 Grading of assignment.
- 7.3.2 Evaluation of exercise.
- 7.3.3 Question and Answer Session.

## **8 BLOODSTAIN EXAMINATION EQUIPMENT & SUPPLIES**

### **8.1 Objectives**

8.1.1 To develop an understanding of the equipment and supplies needed to conduct Bloodstain Pattern Analysis.

### **8.2 Method of Instruction**

#### **8.2.1 Discussion**

8.2.1.1 Review the items of equipment & supplies as follows:

- Tripod
- Safety Glasses
- Camera with Lenses
- Lab Coat/Jumpsuit
- Flash with bracket, flash attachments
- Gloves, booties
- Batteries (for flash, flashlight, camera meter)
- Black Marker
- Film
- Pens/Pencils (assorted colors)
- Bloodstain Scales
- Sketch Forms
- 6” Scales with millimeter
- Graph Paper
- Protractor
- Chartpak Graphic Tape/Different Colors
- String
- Thread
- Flashlight
- Loupe/Magnifier
- Thumb Tacks
- Distilled Water
- Magnifying Glass
- Hemastixs
- Cotton Tip Swabs
- Plastic Bags
- Glassine Envelopes
- Notebook/Paper
- Tweezers
- Adhesive Tapes (1” white tape/duct tape/2” tape)
- Scissors



### **8.3 Modes of Evaluation**

8.3.1 Discuss the purpose of each item with the Training Officer.

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## **9 BLOOD DETECTION**

### **9.1 Objectives**

- 9.1.1 To develop a basic understanding of the theory and procedures for the chemicals used to detect the presence of blood.
- 9.1.2 To become acquainted with the sensitivity and stability of the reagents.
- 9.1.3 To determine the specificity and limitations of the various chemicals.
- 9.1.4 To acquire a thorough understanding of the use of controls.

### **9.2 Methods of Instruction**

#### **9.2.1 Lecture and Discussion**

#### **9.2.2 Literature**

- 9.2.2.1 Gaensslen, R.E., Sourcebook in Forensic Serology, Immunology and Biochemistry, U.S. Department of Justice, U.S. Government Printing Office, Washington, DC (1983).
- 9.2.2.2 Garner, D.D., Cano, K. M., Peimer, R.S., and Yeshion, T.E., "An Evaluation of Tetramethylbenzidine as a Presumptive Test for Blood," JFS, Vol. 21:816-821 (1976).
- 9.2.2.3 Kirk, Paul L., Crime Investigation, John Wiley and Sons, New York, NY (1974).
- 9.2.2.4 Saferstein, R., Ed., Forensic Science Handbook, Prentice-Hall, Inc., Englewood Cliffs, NJ (1982).
- 9.2.2.5 Crime Scene Section Training Manual, Austin Forensic Science Division
- 9.2.2.6 Crime Scene Section SOP, Austin Forensic Science Division
- 9.2.2.7 Courtney, M. and Ekis, T., "A Thousand Points of Light; Defining Blood Spatter Through Chemical Enhancement"
- 9.2.2.8 Grispino, R., "The Effect of Luminol on the Serological Analysis of Dried Human Bloodstains" Crime Laboratory Digest, Vol 17, No 1, Jan 1990.

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- 9.2.2.9 Adair, T.W., Shimamoto, S., Tewes, R. and Gabel, R., “The Use of Luminol to Detect Blood in Soil One Year After Deposition”, IABPA Newsletter
- 9.2.2.10 Adair, T.W., Shimamoto, S., Tewes, R. and Gabel, R., “The Use of Luminol to Detect Blood in Soil Two Years After Deposition”, IABPA Newsletter
- 9.2.2.11 Adair, T.W., Gabel, R., Shimamoto, S. and Tewes, R., “A Comparison of the Luminol and Blue Star Blood Reagents in Detecting Blood in Soil Nearly Four Years After Deposition”, IABPA Newsletter
- 9.2.2.12 Adair, T.W. and Shaw, R., “Enhancement of Bloodstains on Washed Clothing Using Luminol and LCV Reagents”, IABPA Newsletter
- 9.2.2.13 Hill, T., “Visualizing Bloodstain Patterns on Dark or Multi-Colored, Multi-Designed Clothing Using Luminol and Adobe Photoshop Layers”, IABPA Newsletter
- 9.2.2.14 Paonessa, N., “Bloodstains of Gettysburg – The Use of Chemiluminescent Blood Reagents to Visualize Bloodstains of Historical Significance”, IABPA Newsletter
- 9.2.3 Student Exercises
- 9.2.3.1 Develop surfaces exhibiting a known blood sample and affected by various contaminants such as super glue, fingerprint powder, ninhydrin, dye stains, bleach, soap, motor oil, luminol, mold, and environmental conditions (heat, moisture, heat and moisture combined, decomposition, etc...). First, check for false positives caused by the foreign substance and then test the blood stain. Record your observations/finding.
- 9.2.3.2 Satisfactorily complete the crime scene section training module on blood detection. Application and use of Luminol, LCV and Bluestar will be covered and competency tested.
- 9.2.3.3 Read applicable literature.

### **9.3 Modes of Evaluation**

#### **9.3.1 Knowledge**

9.3.1.1 Review of notes in training notebook by training coordinator.

9.3.1.2 Oral and practical examination.

#### **9.3.2 Skills**

9.3.2.1 Observation by training coordinator or designate

9.3.2.2 Satisfactory performance on training exercises.

## **10 BLOODSTAIN EVIDENCE PHOTOGRAPHY AND DOCUMENTATION**

### **10.1 Objectives**

- 10.1.1 To understand the methodology of properly documenting bloodstain patterns using photography, sketching and notes.

### **10.2 Methods of Instruction**

#### **10.2.1 Lecture and Discussion**

- 10.2.1.1 Documentation of Stains and Stain Patterns (See Section 5 of the Virginia Department of Forensic Science Bloodstain Procedure Guide for guidance in this section.)

#### **10.2.2 Literature Reference**

- 10.2.2.1 Austin Police Department Crime Scene Section Training Manual
- 10.2.2.2 Austin Police Department Crime Scene Section SOP
- 10.2.2.3 Schiro, G., "Bloodstain Photography", Louisiana State Police Crime Laboratory, Baton Rouge, LA 70896
- 10.2.2.4 Mosher, S.L., Engels, Rich, "LUMINOL PHOTOGRAPHY", Broward Sheriff's Office, Forensic Services
- 10.2.2.5 Duncan, C., "Bloodstain Photography", IABPA Newsletter

### **10.3 Modes of Evaluation**

- 10.3.1 There are twelve targets available, each with a stain circled. Please use the attached worksheet to record measurement information. Then choose any three to photograph digitally and print out hard copies. Repeat measurements on the hard copies and compare the angle calculations to those from the original stains.
- 10.3.2 Attached are three scenarios accompanied by a few photographs of each situation. Obviously, there is not the benefit of actually seeing the scene and there is only someone else's minimum number of photographs from which to render an opinion. This is often the reality of case situations. Please review the photographs and answer, if possible, the scenario questions. If it is not possible to fully answer the questions, please explain.
- 10.3.3 The group discussion on Bloodstain Evidence Photography will include issues

referencing:

- Assignments 1 & 2
- Basic Documentation of Bloodstain Evidence
- What are the problems with a case in which the only evidence submitted are photographs?
- What are the capabilities and/or limitations in relying on someone else's photographs for analysis?
- Special Techniques in Photography
- Special Films
- Dye Staining
- Luminol
- Alternate Light Sources

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## **11 BLOODSTAIN PATTERN ANALYSIS – MISCELLANEOUS INTERPRETATION**

### **11.1 Objective**

11.1.1 To understand the methodology of Bloodstain Pattern Analysis

### **11.2 Literature References**

- 11.2.1.1 Austin Police Department Crime Scene Section Training Manual
- 11.2.1.2 Austin Police Department Crime Scene Section SOP
- 11.2.1.3 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002
- 11.2.1.4 James, S., Scientific and Legal Applications of Bloodstain Pattern Interpretation, CRC Press, 1999
- 11.2.1.5 Eckert, W. and James, S., Interpretation of Bloodstain Evidence at Crime Scenes, New York, CRC Press 1999
- 11.2.1.6 Bunker, J., Bloodstain Evidence Manual, Doje Press, 1998

### **11.3 Training Tools**

- 11.3.1 Cresap, T. R., “Bloody Bare Footprints – What Size Will They Make?”, Air Force Office of Special Investigation
- 11.3.2 Gifford, W. D., “Bloodstain Survival in Water”, Anchorage Police Department IABPA News, September 1999
- 11.3.3 Bevel, T., “A System for Crime Scene Reconstruction”, Oklahoma City Police Department
- 11.3.4 Gardner, R.M., “Considerations in Crime Scene Analysis”, Special Agent – Army
- 11.3.5 Gifford, W., “Limiting Angles Prove Crucial In Court”, Anchorage Police Department
- 11.3.6 Sadowski, W. D., “Bloody Latent Print on Fabric: A Capital Murder Case”, Indianapolis – Marion County Forensic Services Agency, Indianapolis, Indiana, 1991

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- 11.3.7 Varnon, J., Courtney, M., Ekis, T.R., “Self-wounding of Assailants during Stabbing and Cutting Attacks”, Fort Worth Texas Police Department and Forensic Consultant Services
- 11.3.9 Gardner, R.M., “The Role of Logic in Bloodstain Analysis and Crime Scene Reconstruction”, Special Agent – Army
- 11.3.10 Bone, R., “Exploring the Relationship Between Finger/Palm Prints and Blood”, IABPA Newsletter
- 11.3.11 Lamb, P. and Leak, G., “An Expiratory Bloodstain Pattern Due to Medical Intervention”, IABPA Newsletter
- 11.3.12 Holbrook, M., “Evaluation of Blood Deposition on Fabric: Distinguishing Spatter and Transfer Stains”, IABPA Newsletter
- 11.3.13 Brodbeck, S., “Reflections Upon Arteries and Veins – A Plea for “Spurt Pattern”, IABPA Newsletter
- 11.3.14 Boltman, A., Adair, T.W., and Brown, L., “Evaluation of Blood Saturation as a Mechanism of Change in Stabbing Defects in Clothing”, IABPA Newsletter
- 11.3.15 Adair, T., “Experimental Detection of Blood Under Painted Surfaces”, IABPA Newsletter
- 11.3.16 Leak, G. and Lamb, P., “An Interesting Bloodstain Pattern”, IABPA Newsletter
- 11.3.17 Clark, K., “Differentiating High Velocity Blood Spatter Patterns, Expired Bloodstains, and Insect Activity”, IABPA Newsletter
- 11.3.18 Paonessa, N., “Blood, Fire and Water: The Murder of Isabella Cox”, IABPA Newsletter
- 11.3.19 MacDonnell, H.L., “Another Confusing Bloodstain Pattern”, IABPA Newsletter
- 11.3.20 Sparks, R., “Chronic Venous Insufficiency Syndrome”, IABPA Newsletter
- 11.3.21 Sweet, M., “Correlating Injuries and Bloodstains at a Scene”, IABPA Newsletter
- 11.3.22 Anderson, J., “Sherlockian Theories – Lessons from the Greatest Detective who Never Lived”, IABPA Newsletter



- 11.3.23 Bevel, T., “A Case for Reconstruction”, IABPA Newsletter
- 11.3.24 Reeves, N., “The Police Officer as a Bloodstain Pattern Analyst”, IABPA Newsletter

## **11.4 Experiments & Discussion**

- 11.4.1 Pour a pool of blood and proceed to step into the pool. Photograph and document the results of staining on your shoes and jeans. Now stomp and then later jump into pools of blood. Photograph and document the effects of each action on shoes and jeans. The intensity of these events will be compared and discussed to determine whether or not these type events can create spatter which can be confused with impact and if the presence of bloody shoe impressions are necessary to confirm “stomping”.
- 11.4.2 These exercises will be a lead-in to experimentation and subsequent discussion of “Examination of Bloody Clothing”, “Bloody Latent Print on Fabric.....”, “Bloodstain Survival in Water”. On old articles of clothing made up of different types of fabric create different types of bloodstain patterns such as wipe, contact transfer (impress), spatter, and soak stains onto different areas of the cloth articles. Photograph and document a description of the result of each stain.
- 11.4.3 On the same articles of clothing, take spray bottle and spritz each stain area (with water) at different time intervals. Photograph and document at each interval until comfortable with an effect and/or an established pattern of disturbance that the spritzing creates.
- 11.4.4 Take a separate, dry section of material with dried spatter and expose it to flame. Document the results.

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## **12 REPORT WRITING AND COURT TESTIMONY**

### **12.1 Objectives**

- 12.1.1 To understand the elements of writing a clear and understandable report concerning Bloodstain Pattern Analysis.
- 12.1.2 To understand how to clearly, accurately and understandably present technical Bloodstain Pattern testimony.

### **12.2 Methods of Instruction**

#### **12.2.1 Review of Training Tools/Report Writing**

- 12.2.1.1 Austin Police Department Crime Scene Section Training Manual
- 12.2.1.2 Several Bloodstain Reports

#### **12.2.2 Review of Training Tools/Court Testimony**

- 12.2.2.1 Bevel, T. and Gardner, R. M., Bloodstain Pattern Analysis, New York, CRL Press, 2002
- 12.2.2.2 James, S., “Scientific and Legal Applications of Bloodstain Pattern Interpretation”, CRC Press, 1999
- 12.2.2.3 Eckert, W. and James, S., Interpretation of Bloodstain Evidence at Crime Scenes, New York, CRC Press 1999
- 12.2.2.4 Bevel, T. and Gardner, R., “The Bloodstain Pattern Lab Manual” – reprint
- 12.2.2.5 Murray, D., “An Advocates Approach to Bloodstain Pattern Analysis Evidence: Part I”, IABPA Newsletter
- 12.2.2.6 Murray, D., “An Advocates Approach to Bloodstain Pattern Analysis Evidence: Part II”, IABPA Newsletter
- 12.2.2.7 Young, R., “Watch What You Say”, IABPA Newsletter
- 12.2.2.8 “Scientific Working Group on Bloodstain Pattern Analysis: Topics to Consider in Preparation for an Admissibility Hearing on Bloodstain Pattern Analysis”, Forensic Science Communications, Jan 08, Volume 10, Number 1

- 12.2.2.9 Paul Kirk Transcript and documents from the Sam Sheppard case
- 12.2.2.10 Smith v. Commonwealth, 265 Va., 021583, S.E.2d (2003)
- 12.2.2.11 Mustafa v. USA, Supreme Court, 86-143 (1986)
- 12.2.2.12 Englert v. Macdonell, US Court of Appeals, 06-35465, 06-35531 (2009)
- 12.2.2.13 Terry Lee Laber Transcript from 1979 Jeffery MacDonald Trial
- 12.2.2.14 Affidavit of Terry L. Laber from Darla Routier case
- 12.2.2.15 State of Tennessee v. David Kyle Gilley, Court of Criminal Appeals, M-2006-02600-CCA-R3-CD, 2008
- 12.2.2.16 Article – Murder by the book, Murder by Deception; 2010
- 12.2.2.17 SWIGFAST, Bibliography Project, April 2009
- 12.2.2.18 “A Battle of Blood Spatter Experts and the Shenanigans of a Texas Prosecutor”

### 12.3 Modes of Evaluation

#### 12.3.1 Discussion and Review of Elements Studied

#### 12.3.2 Preparation for Mock Trial

- 12.3.2.1 The student has been provided with the following the above listed reference materials. The trainee will review all this material in preparation for the following exercise.
- 12.3.2.2 Perform the two exercises provided and write extensive notes on each pattern. Include range of stain sizes, overall pattern distribution size, the distance between stains within the distribution, the absence or presence of stain shape differences, the continuity or chaotic nature of the stain distribution within the pattern, and if the pattern is “consistent with” or “characteristic of” a particular category. The trainee will write a report which includes all observations and conclusions.

- 12.3.2.3 Analyze the cases provided by the training coordinator, using all knowledge developed from the training course. The trainee will prepare a report of observations and conclusions. This case will be worked in accordance with all policies and procedures and within the framework of the LIMS reporting system.
- 12.3.2.4 Once a case is selected by the training coordinator, the trainee will prepare a list of questions as if the defense attorney will challenge the competency of an examiner, the analysis and the bloodstain testimony in a court of law.

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## **Training Checklist**

### **1 Introduction and Orientation**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

### **2 The History of Bloodstain Pattern Analysis**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

### **3 Bloodstain Pattern Analysis Terminology & Definitions**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

### **4 Physical Properties of Blood**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

### **5 Size, Shape and Distribution**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

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**6 Common Pattern Types**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

**7 Origin Determination**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

**8 Bloodstain Examination Equipment & Supplies**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

**9 Blood Detection**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

**10 Bloodstain Evidence Photography and Documentation**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

**11 Bloodstain Pattern Analysis – Miscellaneous Interpretation**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_

**12 Report Writing and Court Testimony**

Completion Date: \_\_\_\_\_

Trainee Acknowledgement: \_\_\_\_\_

Trainer Acknowledgement: \_\_\_\_\_