Scientific Working Group on Bloodstain Pattern Analysis: Educational Model for Introductory Bloodstain Pattern Analysis Training[1]

Scientific Working Group on Bloodstain Pattern Analysis (SWGSTAIN)

Objective

This document provides a recommended framework for the development of introductory bloodstain pattern analysis (BPA) training.

Introduction

The Scientific Working Group on Bloodstain Pattern Analysis (SWGSTAIN) comprises BPA experts from North America, Europe, New Zealand, and Australia. SWGSTAIN provides a professional forum in which practitioners in BPA and related fields can discuss and evaluate methods, techniques, protocols, quality assurance, education, and research. SWGSTAIN's ultimate goal is to use these professional exchanges to address substantive and operational issues within the field of BPA and to work to build consensus-based, or "best practice," guidelines for the enhancement of the discipline of BPA.

Statement of Purpose:

SWGSTAIN recognizes and has developed an educational model for introductory BPA training. The following is a minimum recommended framework of instruction provided to the students by the instructor. A minimum of 40 hours[2] of classroom training encompassing lecture, case studies and practical exercises is recommended to meet the objectives outlined herein. The instructor(s) must be trained and competent in the subject matter for which they provide instruction. Participants who only complete an introductory BPA training course are not experts in BPA, are not qualified to author or peer review (technical review) a technical BPA report, are not qualified

---

[1]Not intended to direct the sequence of the material presented, but provide the framework for Introductory Training.

[2]40 hours is the minimum recommended time frame for the instruction of an introductory bloodstain pattern analysis workshop. Further training and education in BPA must be completed to develop competency in BPA.

to testify as an expert witness in BPA and not qualified to be a primary instructor on a BPA course.

Definitions

As used by SWGSTAIN, the following terms are meant to convey the meanings specified**:**

Must – Done without exception

Should – Expected to be done

Recommended – Appropriate, but not mandatory

Training Goals:

At the completion of an introductory BPA course, participants should be able to demonstrate:

Knowledge of the history and development of BPA;

Knowledge of health and safety precautions;

Knowledge of the physical characteristics of blood;

Knowledge of limitations of BPA;

The ability to recognize basic bloodstain patterns, document and preserve bloodstain pattern evidence for analysis by a qualified bloodstain pattern analyst;

Knowledge of bloodstain pattern evidence collection.

Instruction Topics

1. Fundamental Concepts

    1.1. Awareness of the history and development of BPA including but not limited to the contributions of:

        - Piotrowski
        - Balthazard
        - Kirk

- MacDonell
- International Association of Bloodstain Pattern Analysts (IABPA)
- Other organizations or associations dedicated to forensic science disciplines or awareness at an international, national, or local level i.e., International Association for Identification (IAI), Canadian Society of Forensic Science.
- SWGSTAIN

1.2. Demonstrate knowledge of health and safety precautions

- Blood borne pathogens and other related health hazards
- Personal protective equipment (PPE) for biohazard safety

1.3. Demonstrate knowledge of the physical characteristics of blood

- Composition of blood
- The physical characteristics of blood relevant to bloodstain pattern analysis
  - Human blood vs. non-human
  - Effects of drugs and alcohol

1.4. Awareness of the scientific method and its application to BPA.

- Information gathering
- Observations
- Hypothesis formulation
- Experimentation
- Analysis of data
- Conclusions

1.5. Awareness of Mathematics and Physics as it pertains to BPA

- Mathematics
  - Metric system/Imperial system
  - Calculator
  - Available measuring devices
  - Trigonometry formulas used in BPA

- Physics
  - Surface tension
  - Viscosity
  - Gravity

- Terminal velocity
- Oscillation
- Drop formation
- Flight paths

2. Awareness of management of bloodstain pattern evidence

2.1. Determine need for BPA
- Laboratory, scene or documentation/photograph-based request

2.2. Presumptive blood tests
- Scene
- Laboratory

2.3. History of scene dynamics
- Origin of Evidence
- Post-event intervention

2.4. Preservation
- Environmental factors
- Scene integrity

2.5. Documentation
- Note taking
- Photography and video imaging
  - Procedures
  - Scales
  - Lighting
- Diagrams and sketches
- Documentation practicals must be performed by each student

2.6. Pattern recognition
- Terminology
  - SWGSTAIN
  - Historical
- Practicals and experimentation must be performed by the student.
- Experiments and practicals must include but are not limited to exploring:
  - Variations of force
  - Blood volume effects
  - Weapon effects
  - Blood source to target distance variations

- The following topics must be addressed through discussions, experiments, practicals, and case studies:
  - Altered stain
  - Angle of impact determinations
  - Area of convergence
  - Area of origin
  - Cast-off pattern
  - Directionality
  - Drip pattern
  - Drip stains
  - Drip trails
  - Flow pattern
  - Impact pattern
  - Influence of volume and distance on drip stain diameter
  - Projected pattern
  - Splash pattern
  - Swipe pattern
  - Target surface effects
  - Transfer stain
  - Void
  - Wipe Pattern
- The following topics must be at least addressed by discussion. Experiments, practicals and case studies optional.
  - Clotting times
  - Drying times
  - Expiration pattern
  - Forward spatter and back-spatter
- The importance of bloodstain pattern characteristics
  - Number of stains
  - Stain size
  - Stain shape
  - Stain appearance
  - Stain distribution
  - Pattern location

2.7. Collection of evidence for laboratory analysis

- Proper documentation of specific stains and evidence to be collected
- Collection methods
- Contamination Issues
- Packaging
- Evidence Storage
- Evidence Preservation during transportation
- Evidence submission to Laboratory
    - Communication
    - Multidisciplinary processing
- Special considerations for the collection of bloodstained clothing
    - *In situ* photographs
    - Handling of wet clothing
    - Collection and packaging
- Changes to bloodstain pattern appearance as a result of improper item handling, packaging, storage and transportation

3. Awareness of the factors affecting bloodstain appearance including but not limited to:

3.1. Surface characteristics of target surface

- Absorbency
- History
- Porosity
- Texture

3.2. Environmental factors

- Air flow
- Humidity
- Temperature
- Weather

3.3. Post incident activity

- Animal Activity
- Fire Effects
- Fire suppression
- Fire responders
- Medical intervention
- Members of the public
- Movement of the injured

- Staging of scene evidence

4. Awareness of how BPA data is used
   4.1. Event Reconstruction
        - Supplementary case information including but not limited to:
            - Medical reports
            - Autopsy reports
            - Laboratory reports
            - Other relevant documents
        - Interpretation of Data
        - Sequence of Events
   4.2. Scientific technical reports[3]
        - Interpretations, Opinions and Conclusions
        - Technical review

   4.3. BPA expert witness testimony

5. Awareness of ethical behavior
6. Awareness of contextual bias effects on BPA
7. Awareness of the limitations of BPA

8. Additional BPA Topics[4]
   8.1. Search Techniques
        - Visual
        - Magnification
        - Forensic Light Sources
        - Chemicals
   8.2. Confirmatory blood tests
        - Scene
        - Laboratory
   8.3. Enhancement Techniques
        - Forensic Light Sources
        - Chemicals
        - Computer
        - Photographic

[3] Refer to SWGSTAIN "Guidelines for Report Writing in Bloodstain Pattern Analysis" document.
[4] At the discretion of the course instructor or agency

8.4. Computer Assisted Methods

- Required Documentation Procedures
  - Cartesian co-ordinate system
  - Photography
  - Plumb line
  - Use of scales

8.5. Biological testing and its application to BPA

8.6. Three-dimensional crime scene scanning and photogrammetry

8.7. Other relevant topics

9. Student Assessment

9.1. There must be a written examination to test knowledge for the training goals[5].

9.2. Evaluation by performance in practicals is required.

[5] A passing score of 70% or higher is recommended.

GLOSSARY

Awareness - Having knowledge or realization.

Cartesian coordinate - A system of representing points in space in terms of their distance from a given origin measured along a set of mutually perpendicular axis (written X, Y, Z) with reference to 3 axes.

Demonstrate - To show clearly and deliberately. To present by experiments, examples or practical application.

Experiment – A scientific procedure undertaken to make a discovery, test a hypothesis, or demonstrate a known fact.

Imperial measurement system - A system of measurement which includes using inches and feet.

Knowledge – Facts, information and skills acquired by a person through experience or education; theoretical or practical understanding of a subject.

Metric measurement system - A system of measurement which includes using millimeters, centimeters and meters.

Practical - A lesson or exam in science or technology in which students have to do or make things, not just read or write about them.

SWGSTAIN Terminology - Forensic Science Communications, April 2009, Vol. 11, #2.