Experiment 22

Bloodstain Pattern Geometry (Part A)

Purpose

Acquire familiarity with the basic geometric shapes and patterns formed by droplets of blood when they impact various target surfaces and learn the basic concepts and rationales used to recognize, document, and interpret bloodstain evidence.

Equipment and Supplies

1. Artificial blood (see instructions for preparation below)
2. 30- to 60-mL dropper bottle or 50-mL beaker for storing artificial blood
3. Disposable pipettes
4. Plain white typing paper
5. 12-in. square pieces of cardboard
6. 12-in. square pieces of 1/8-in.-thick, smooth, clear or white sheets of acrylic
7. 12-in. square pieces of plywood
8. Paper towels
9. Tape measure
10. Ruler
11. Meter stick
12. Protractor

Procedure

1. Draw a quantity of artificial blood into a pipette or dropper bottle and wipe off any excess from the outside of the tip with a paper towel. Be careful not to include air bubbles in the liquid.
2. Drop a single drop of artificial blood straight down onto each surface texture to be tested from heights of 1 in., 2 in., 36 in., and 72 in. Figure 22.1 shows patterns formed when a drop of artificial blood is dropped onto a piece of white typing paper from various heights.
3. The test materials should be placed flat on the floor and the pipette should be held perpendicular to the surfaces when the drops are released.
4. Make your observations while the stains are wet and after the stains are thoroughly dried.

Bloodstain Pattern Glossary

Angle of impact — Angle at which a blood drop strikes a target surface.
Back spatter — Blood that travels back toward the direction of the initiating force.
Blood spatter — Pattern formed when blood touches a surface.
Cast-off blood — Blood collected by and then cast from a moving object.
Contact stain — Result of contact of a bloody article and a surface.
Point of origin — Location from which blood originates.
Smear — Pattern left when a bloody object is wiped across a surface.
Target — Surface on which blood is deposited.
Transfer pattern — Pattern transferred to a surface when a bloody object comes into contact with it.

Artificial Blood Preparations

1. Mix 4 oz of evaporated milk, 2 to 3 tbsp of tomato paste, and red food dye to the viscosity of blood. Use water as a solvent. The mixture should be freshly made. It can be stored in a refrigerator for a few days.
2. Mix Carnation® dry milk, red food dye, and water to the viscosity of blood.
3. Mix white corn syrup and red food dye until the mixture has the appearance of blood.

Report

1. Report your observations.

2. Sketch or photograph each specimen. (See Figure 22.1.)

3. For each surface texture examined, make the following observations:
   A. Describe the texture of the surface: hard or soft; smooth or rough; porous or nonporous; absorbent or nonabsorbent.
   B. Describe the edge characteristics of the resulting stains.
   C. Measure the diameter (in mm) of each drop.
   D. Describe the extent of peripheral satellite spattering.
   E. Discuss what effect the changing drop heights had on the resulting stains.
   F. Experiment with other surface textures such as floor tiles, carpets, textiles.