Bloodstain Science

BPA = Bloodstain Pattern Analysis

What can an investigator learn from the analysis of a blood spatter?

➤ Type and velocity of weapon
➤ Number of blows
➤ Handedness of assailant (right or left-handed)
➤ Position and movements of the victim and assailant during and after the attack
➤ Which wounds were inflicted first
➤ Type of injuries
➤ How long ago the crime was committed
➤ Whether death was immediate or delayed

Source: http://science.howstuffworks.com/bloodstain-pattern-analysis1.htm

BPA Terms

Spatter – Bloodstains created from the application of force to the area where the blood originated.

Origin/Source – The place from where the blood spatter came from or originated.

Angle of Impact – The angle at which a blood droplet strikes a surface.

Parent Drop – The droplet from which a satellite spatter originates.

Satellite Spatters – Small drops of blood that break off from the parent spatter when the blood droplet hits a surface.

Spines – The pointed edges of a stain that radiate out form the spatter; can help determine the direction from which the blood traveled.

Satellite Spatter   **Parent Drop**

Spines
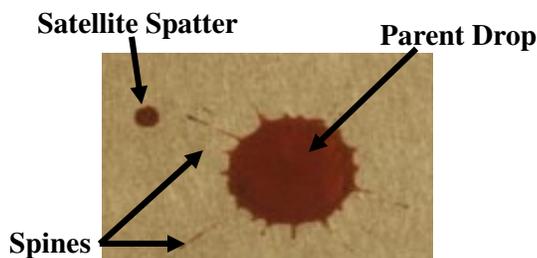
Blood Detection Methods

Physical Examination & Light Source
Investigators will first examine the crime scene to look for areas that may contain blood. They may also use a high-intensity light or UV lights to help them find traces of blood as well as other bodily fluids that are not visible under normal lighting conditions.

Blood Reagent Tests (Called presumptive tests)
These tests are used to detect blood at crime scenes based upon the properties of hemoglobin in the blood. Further tests at the crime lab can determine if it is human blood or not. The Kastle-Meyer tests uses phenolphthalein and hydrogen peroxide, while HemaStix is a paper strip coated with TMB.

Luminol
This chemical is used to locate traces of blood, even if it has been cleaned or removed. Investigators spray a luminol solution throughout the area under investigation and look for reactions with the iron present in blood, which causes a blue luminescence.

Fluorescein
This chemical is also capable of detecting latent or old blood. However, a special light and goggles are used to detect any illuminated areas, which appear greenish-white if blood is present. It may also react to many of the same things as luminol (copper and bleach).

LCV or **Leuco Crystal Violet**, is one type of chemical process that is used for blood enhancement to make the blood evidence more visible so it can be photographed and analyzed.

Types of Bloodstain Patterns

Passive Bloodstains - Patterns created from the force of gravity; can be a single drop, series of drops, flow patterns, blood pools, etc.

Projected Bloodstains - Patterns that occur when a force is applied to the source of the blood; includes low, medium, or high impact spatters, cast-off, arterial spurting, and expiratory blood blown out of the nose, mouth, or wound.

Transfer or Contact Bloodstains - The pattern created when a wet, bloody object comes in contact with a target surface; may be used to identify an object or body part.

Spatter Time

Lab 2: Multiple Drops

What happened when one drop landed on top of another one?

What did you notice about the diameter of the parent droplets as you increased the height of the drop?

What do you notice about the diameter of the satellite spatter as you increased the height of the drop?

Lab 1: Single Drops

What did you notice about the diameter of the parent droplets as you increased the height of the drop?

How do the spines compare from the different heights?

Lab 3: Motion Droplets

Draw a sketch of the droplets showing the size, shape, and/or distance between them at each speed in the chart below.

Walking Rate	Sketch of Droplets (Shape/Distance)
Slow	
Normal	
Fast	

What did you notice about the shape of the droplets as you increased your walking speed?

What did you notice about the spines as you increased your walking speed?

What did you notice about the distance between the droplets as you increased your walking speed?

Lab 4: Angle of Impact

What did you notice about the shape of the droplets as you increased the angle of the paper?