

## LESSON 2-6: FALLING BLOOD DROPS

### A LESSON ON BLOOD-DROP ANALYSIS

The patterns left by falling or projected drops of blood can help investigators determine where a crime took place. Therefore, blood drops and stains should be examined closely before the evidence is collected.

#### *Shapely Drops*

The shape of a blood drop can indicate the distance from which the blood fell and the angle of its impact. However, very few studies have been done on the patterns produced when blood impacts a surface. Therefore, a thorough forensic scientist will carry out his or her own experiments on the shape of blood droplets. To be accurate, this scientist will conduct the tests under conditions very much like those found at the crime scene.

While a droplet is falling, it is primarily spherical in shape. This is surprising to some people, who may have visualized droplets as tear shaped, as cartoonists often draw them. The smaller a drop, the more spherical its shape during a fall.

#### *Drop Acceleration*

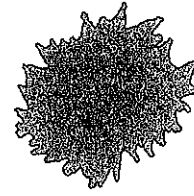
As a drop falls through the air, it accelerates until it reaches a constant or terminal velocity. Measurements have shown that a blood drop, resulting from dripping at a height of 15 feet, has a volume of about 0.05 ml and falls at a velocity of about 25 feet per second. Smaller drops have a terminal velocity that is less than 25 feet per second, and larger drops have a terminal velocity that is greater than 25 feet per second. Therefore, an individual blood droplet can give an investigator the following useful information:

- a. the droplet's speed at time of impact,
- b. the direction of the droplet's travel, and
- c. the approximate size of the blood drop.

#### *Round Drops*

If you examine a blood droplet that struck a surface straight-on (at a 90-degree angle from the surface), the droplet is generally round. Straight-on impacts on hard, smooth surfaces produce round droplets with smooth edges. Higher velocities and rougher surfaces produce drops with more ragged edges (see Figure 14).

Figure 14. Drops that have ragged edges have fallen at high velocities.



### *Elongated Drops*

The angle of impact of a droplet affects the droplet's shape. As we have said, when the angle of impact is 90 degrees, the droplet is round. However, droplets that fall on surfaces at an angle that is greater than 90 degrees have elongated shapes. The larger the angle, the more elliptical the droplet (see Figure 15).

Figure 15. Droplets that fall on surfaces at angles greater than 90 degrees form elliptical patterns.



### *Dripping and Spraying*

Blood drops can be produced in several ways. A droplet that forms slowly, as in a dripping wound, has a volume of about 0.05 ml. However, smaller droplets are produced during active situations, such as fights and beatings. Blood droplets as small as an aerosol spray indicate that the wound was produced by a powerful force, such as a gunshot or an explosion.

## Glossary of Key Bloodstain Pattern Analysis Terms

**Angle of Impact:** the angle at which a blood droplet strikes a surface

**Arterial Gushing:** the large pattern of blood that is created when blood escapes an artery under pressure; the increase and decrease in blood pressure is apparent

**Arterial Spurts:** large patterns created under pressure, but with less volume and usually more distinctive evidence of blood pressure rising and falling

**Clot:** a mass of blood and other contaminants caused through clotting mechanisms

**Cast-Off Stains:** blood that has been thrown from a secondary object (weapon or hand) onto a target other than the impact site

**Drop Patterns:** characteristic patterns present when blood drips into standing, wet blood

**Expiratory Blood:** blood which is spattered onto a target, as a result of breathing; typically, this occurs when an injury is sustained to the throat, mouth, or airway

**Impact Site:** usually the point on the body that received the blow or applied force, from which the blood was shed

**Origin:** the point in space where the blood spatter came from

**Parent Drop:** the droplet from which satellite spatter originated

**Projected Blood:** blood under pressure that strikes a target

**Satellite Spatters:** small drops of blood that break off from the parent spatter when the parent droplet strikes a target surface

**Shadowing/Ghosting/Void:** a pattern that helps to place an object or body in the scene; normally, the area in question lacks blood even though areas surrounding it show blood

**Skeletonized Stain:** the pattern left when an object moves through a partially dried stain, removing part of the blood, but leaving the outline of the stain intact

**Spatter:** bloodstains created from the application of force or energy to the area where the blood is

**Spines:** the pointed edges of a stain that radiate out to form the spatter

### DID YOU KNOW?

Before a drop of blood can fall (without being forced by an external source of applied energy) gravitational attraction acting on blood must exceed its surface tension.



#### DID YOU KNOW?

Correct interpretation of bloodstain patterns must include consideration of the surface texture of the material upon which the bloodstains have been deposited.

**Splash:** pattern created when a volume of blood in excess of 1 mL strikes a surface at a low to medium velocity

**Swipe:** the transfer of blood onto a target surface by a bloody object that is usually moving laterally

**Transfer Pattern:** the pattern created when a wet, bloody object comes in contact with a target surface, leaving a pattern, that has the features of the object making it useful for identifying the object

**Target:** the surface where the blood ends up

**Wipe:** pattern created when a secondary target moves through an existing wet blood stain on some other object