D30 Weapon Width Determination Using Cast-Off Blood Spatter

Lindsay M. Lambert, MS, 1807 Pheasant Run Drive, Maryland Heights, MO 63043; and Marilyn T. Miller, EdD, Virginia Commonwealth University, 1020 West Main Street, #2017, Box 843079, Richmond, VA 23284-3079*

The goal of this presentation is to show attendees that cast-off blood spatter can be useful in the determination of weapon width using both the phenomenon of side-by-side blood drops within cast-off spatter trails and the proportionality of width between the spatter trails and respective weapons of use.

This presentation will impact the forensic science community by demonstrating the phenomenon of weapon determination using cast-off blood spatter and its application in the investigation and discovery of the weapon in question in forensic casework, including analysis at the crime scene.

Bloodstain pattern analysis can be a very useful aid in the investigation and reconstruction of a crime. Created when blood comes in contact with a surface following a bloodshed event, key pieces of information may be obtained including the object in question and the minimum number of blows. Different bloodshed events produce varying bloodstain patterns. Impact spatter, and more particularly cast- off blood spatter, is created when blood is flung or projected from an object in motion, following adherence of a sufficient volume of blood to the object. When swung, blood will be propelled off the end. This action is the result of the angular momentum overcoming the surface tension of the blood. The result of such action is distinct linear patterns, or trails, of bloodstain. SWGSTAIN defines a cast-off pattern as a bloodstain pattern resulting from blood drops released from an object due to its motion.

Crime scene casework has seen the potential of side-by-side drops, an uninvestigated cast-off blood spatter stain phenomenon. The objective of this research is to investigate the phenomenon of observed side-by-side cast-off blood spatter stains to determine the relative size of the swinging object. As different objects have more surface area and create different linear patterns, the volume of blood present on the object and the width of the object are important in the determination of the object of interest based on the examination of the resultant cast-off pattern. By varying weapon characteristics, experimentation will be conducted to confirm this principle. Observations of spatter trail widths will also be performed for comparison to the weapon of creation's widths.

In this study, twenty-five objects of varying sizes, construction, and dimensions commonly used as weapons were used to generate cast-off blood spatter for analysis. These objects included tools/building materials (pry bar, an adjustable wrench, two different sizes of hammers, a wooden stake, a metal ruler, painters' pole, brick and two different sizes (length and diameter) of PVC piping), metal blades (switchblade, butter knife, axe, and machete), and sport equipment/miscellaneous items (plastic bat, golf club, hair brush, spatula, hardcover book, remote control, plastic sword, wine bottle and ice scraper). Each weapon was moved in a manner analogous to a bloodshed event producing cast-off spatter. Observations were made regarding the width of the spatter trails and the presence of any side-by-side drops.

Twenty-two of the weapons produced the desired side-by-side drops, with the other three illustrating alternate results. Both the axe and switchblade resulted in vertical drop pairings, corresponding to the height, rather than the width of the weapon blade. The butter knife was the only weapon to result in no visible pairings. Following repeated experimentation, the results were found to be reproducible. Proportional spatter trail widths were also observed for all weapons used. Overall, the results of the experimentation were able to demonstrate the correlation between weapon widths and spatter trail width.

The appearance of side-by-side stains was also observed, supporting the aim of this project.

Cast-Off Spatter, Weapon Width, Side-by-Side Blood Drops

 ** Presenting Author*